ENGINEERING DIVISION
Commercial Aircraft Group
ISRAEL AIRCRAFT INDUSTRIES LTD

HarnesSYS™

User Manual
for

MANUFACTURING

Notices

The information contained in this manual is believed to be accurate and reliable. However, Israel Aerospace Industries Ltd. (IAI) assumes no responsibility for any errors, omissions, or inaccuracies whatsoever.

Information in this document is subject to change without notice and does not represent a commitment on the part of Israel Aerospace Industries Ltd. (IAI). The software and/or data base described in this document are furnished under a license and/or agreement. The software and/or data base may be used or copied only in accordance with the terms of such license and/or agreement. It is against the law to copy the software on any medium except as specifically allowed in the license and/or nondisclosure agreement. The purchaser may make one copy of the software for backup purposes. No part of this document and/or data base may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or information storage and retrieval systems, for any purpose other than the purchaser's personal use, without the express written permission of IAI.

2007 Israel Aerospace Industries Ltd. All rights reserved.

Pub. Number TSN140/930394 Issue B Revision 0 Version 16.00

Prepared by

IAI ENGINEERING DIVISION
Commercial Aircraft Group
ISRAEL AIRCRAFT INDUSTRIES LTD

Table of Contents

Introduction 5
Documents required for Manufacturing: 5
2D Routing Diagrams 5
Jig (or Form Board) Diagrams 5
Build-to-Package (BTP) Documents 5
Manufacturing Build-to-Package Documents (MBTP) 6
Manufacturing Operations 6
Chapter 1: Setting Manufacturing Project Defaults 9
Operating Instructions 9
Brady Tape Defaults 11
Braid Defaults 12
Chapter 2: Integrating an MBTP Package 15
Operating Instructions 15
Creating the Work Order Report 16
Selecting Inactive Paths 17
Selecting Starting Connectors 18
Manually Selecting Starting Connectors 19
Automatic Selection - By Diameter 21
Automatic Selection - By Number of Wires 22
Updating Brady Tape Definitions 25
Creating a Working Report 26
Error Messages 27
The Work Order Report 28
Banner Page 28
Section 1: Twist Sequence 29
Section 2: List of 1st End Solder 33
Section 3: List of 2nd End Solder 36
Section 4: List of Wires Not Connected at Either End 39
Section 5: Wires Link the Following Connector Pairs 42
Chapter 3: Making Modifications 45
Chapter 4: Manual Changes for Manufacturing 47
Setting Path Conditions 49
To Display Only Jumpers: 50
To Set Path Conditions: 50
To Set From F/T/I Conditions: 50
To Set To F/T/I Conditions: 51
To Set From Connector Conditions: 51
To Set To Connector Conditions: 52
To Set From Coil Number Conditions: 52
To Set To Coil Number Conditions: 53
To Display All Jumpers and Paths: 53
The Manufacturing Methods Window 54
Making Changes 55
Changing Paths Data 55
Changing Wires Data 56
Changing Designator and Coil No. Data 57

Chapter 5: MBTP Reports 61
Creating MBTP Reports 62
Banner Page 63
Coil Summary 65
Wire List by Coil 67
Wire List 1st End Terminator 70
Wire List 2nd End Terminator 73
Notes 75
Hand Ringout 76
Chapter 6: Release MBTP Document 79
Releasing the MBTP Document 79
Index 81

HarnesSYS Manufacturing User Manual

Introduction

HarnesSYS offers a comprehensive software package for manufacturing the wire bundles designed using the engineering facilities of ***HarnesSYS***. Using this package, an array of reports, schematic diagrams and specialized documents can be produced to optimize the manufacturing process and make maximum use of the engineering and design data in the system.

This introduction describes
- the documents and components required for Manufacturing
- the Manufacturing Operations.

Documents required for Manufacturing:

2D Routing Diagrams

A *2D Routing diagram* shows the layout of the bundle as it is manufactured on the jig board (including all the branches and terminator parts in the bundle, branch sizes, etc.). Since they are not really intended for manufacturing, 2D Routing diagrams are not to scale.

Jig (or Form Board) Diagrams

A *Jig diagram* is a 2D full-scale drawing of the jig (or form board) required to produce a harness. It includes all the information needed, including Clocking Angles, labels, protective devices, etc. Jig Drawings are automatically obtained by integrating 2D Routing diagrams (created by ***HarnesSYS***) or flattening 3D Routing diagrams (imported into ***HarnesSYS***).
Jig diagrams are also used as input to Integration programs that calculate the length of the wires in the bundle and the diameter of wires and segments.

Build-to-Package (BTP) Documents

A *Build to Package* document (also called an *Engineering BTP*) contains all the documents needed to produce a particular bundle, including:

Wire List	describes the wires used in the bundle, including end terminators, the Type, Circle, Part Number, Quantity, and description of each wire. It also details the Bin Code/Lug, Part Number, Quantity, and Description of each terminator (e.g., splice) in the bundle.
Parts List	describes the parts used in the bundle.
2D Routing	a two dimensional, not-to-scale layout drawing of the bundle.
Jig	a two dimensional, full-scale (1:1) layout drawing of the jig required to produce the bundle.

For details on how to define a BTP document, see your Configuration Control user manual in Volume 6 of the ***HarnesSYS*** user documentation.

Manufacturing Build-to-Package Documents (MBTP)

After an Engineering BTP is created, manufacturing personnel can build their own *Manufacturing Build-to-Package (MBTP)* based on it.

An MBTP document is integrated in order to create a Work Order file which details the assembly of the bundle (see Chapter 2: Integrating an MBTP). The information presented can be customized to meet specific manufacturing needs using forms activated via the Manufacturing Methodology program.

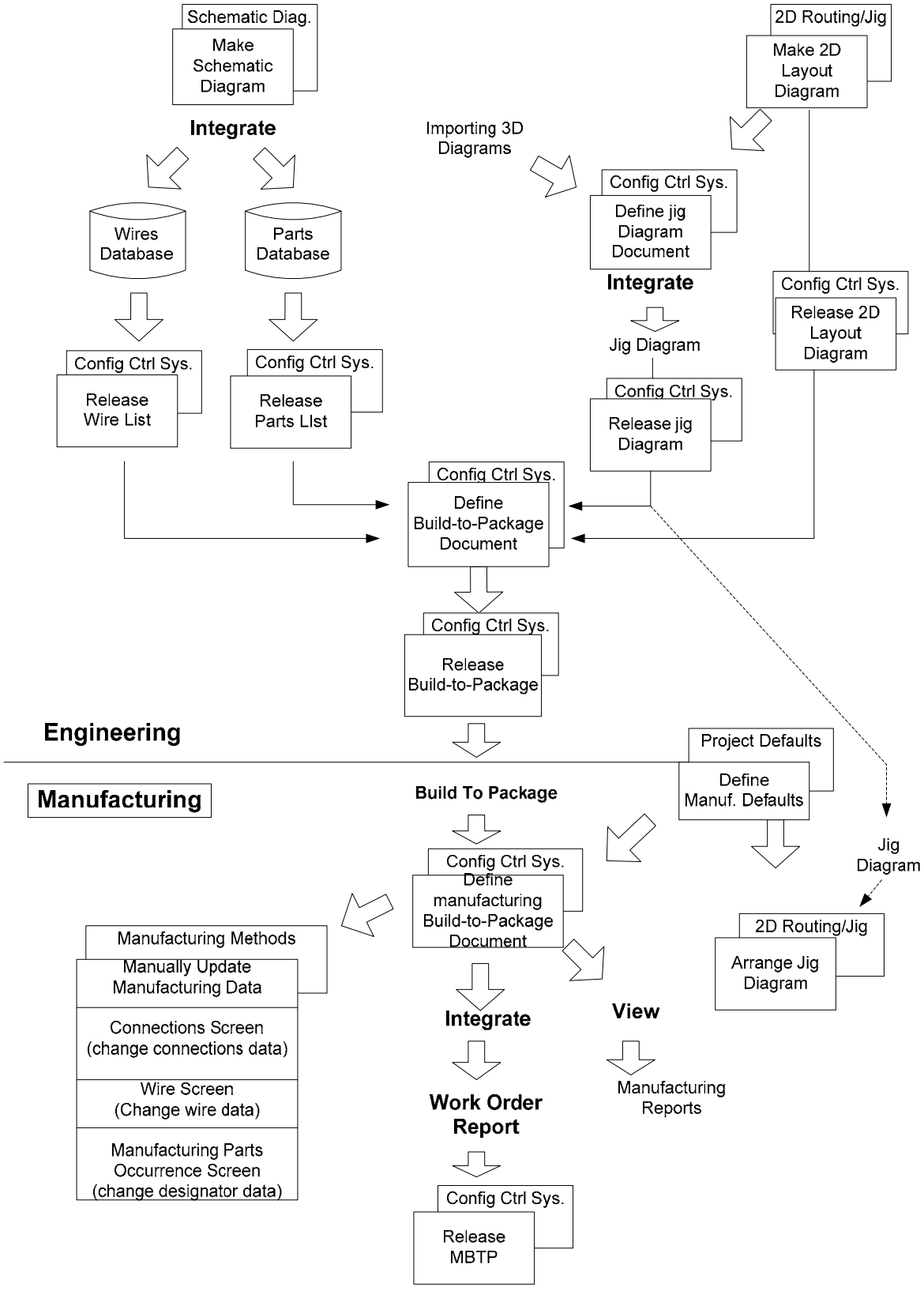
For details on how to define an MBTP document, see your Configuration Control user manual in Volume 6 of the ***HarnesSYS*** user documentation.

Manufacturing Operations

The following operations are involved in the manufacturing process:

- **defining the MBTP document** - see your Configuration Control System manual for details.
- **updating manufacturing defaults for the project** (Brady tape, additional wire length needed for Brady tape, minimum distances between Braid Stops, etc.),
- **editing the jig and jig table** (jig table dimensions, rotate, bend, symbols) using the ***HarnesSYS*** 2D Routing/Jig program,
- **integrating the MBTP document to produce a Work Order report file**,
- **making manual changes to manufacturing data** (***not*** engineering design data),
- **producing other manufacturing reports**.

The following figure illustrates the manufacturing process. The upper section of the figure describes the engineering processes that must precede the manufacturing activities. The ***HarnesSYS*** program used to perform each operation is printed in the background box of the operation.


Schematic Diag.
Make Schematic Diagram
Integrate
Wires Database
Parts Database
Config Ctrl Sys.
Release Wire List
Config Ctrl Sys.
Release Parts LIst
2D Routing/Jig
Make 2D Layout Diagram
Importing 3D Diagrams
Config Ctrl Sys.
Define jig Diagram Document
Integrate
Jig Diagram
Config Ctrl Sys.
Release jig Diagram
Config Ctrl Sys.
Release 2D Layout Diagram
Config Ctrl Sys.
Define Build-to-Package Document
Config Ctrl Sys.
Release Build-to-Package
Engineering
Manufacturing
Project Defaults
Define Manuf. Defaults
Build To Package
Jig Diagram
Config Ctrl Sys.
Define manufacturing Build-to-Package Document
2D Routing/Jig
Arrange Jig Diagram
Manufacturing Methods
Manually Update Manufacturing Data
Connections Screen (change connections data)
Wire Screen (Change wire data)
Manufacturing Parts Occurrence Screen (change designator data)
Integrate
View
Manufacturing Reports
Work Order Report
Config Ctrl Sys.
Release MBTP

Engineering & Manufacturing Operations

The ***HarnesSYS*** Manufacturing User Manual contains 6 chapters:

Setting Manufacturing Project Defaults
Chapter 1 describes the Manufacturing project defaults, provides examples of the parameters and explains how to set them.

Integrating an MBTP
Chapter 2 explains how to integrate a Manufacturing Build-to-Package document in order to produce a Work Order file. This chapter also describes each section of the Work Order file.

Making Modifications
Chapter 3 explains how to incorporate design changes into manufacturing after the manufacturing reports have already been produced.

Manual Changes for Manufacturing
Chapter 4 explains how to manually modify manufacturing data.

MBTP Reports
Chapter 5 describes additional manufacturing reports and explains how to produce them.

Release MBTP
Chapter 6 shows how to release an MBTP Document.

Chapter 1: Setting Manufacturing Project Defaults

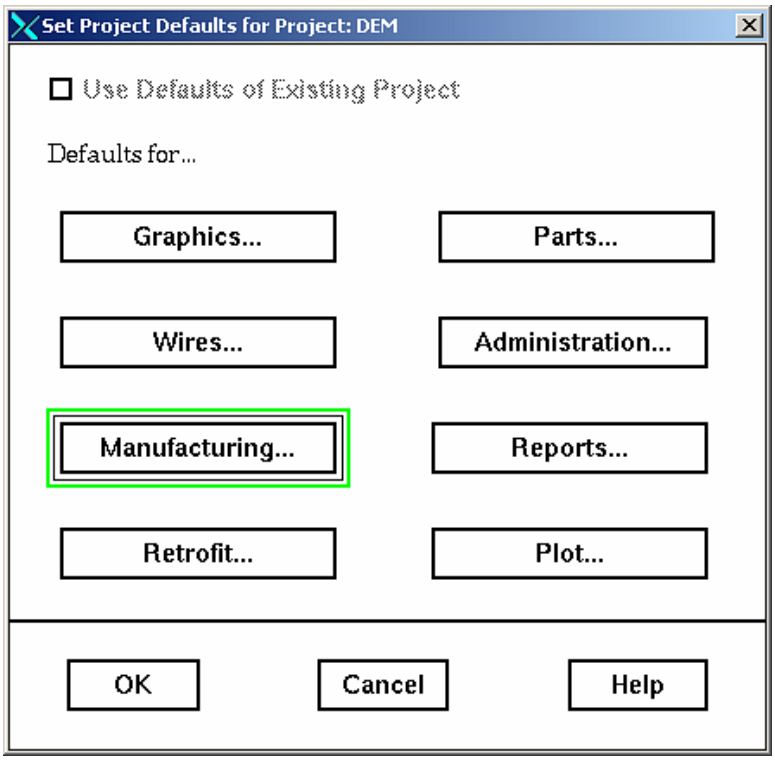
This chapter shows how to set manufacturing default values related to the braids and Brady tapes used in the project.

Operating Instructions

In order to set the manufacturing defaults for the current project, follow these steps:

1. Select **Maintenance → Project Defaults...**

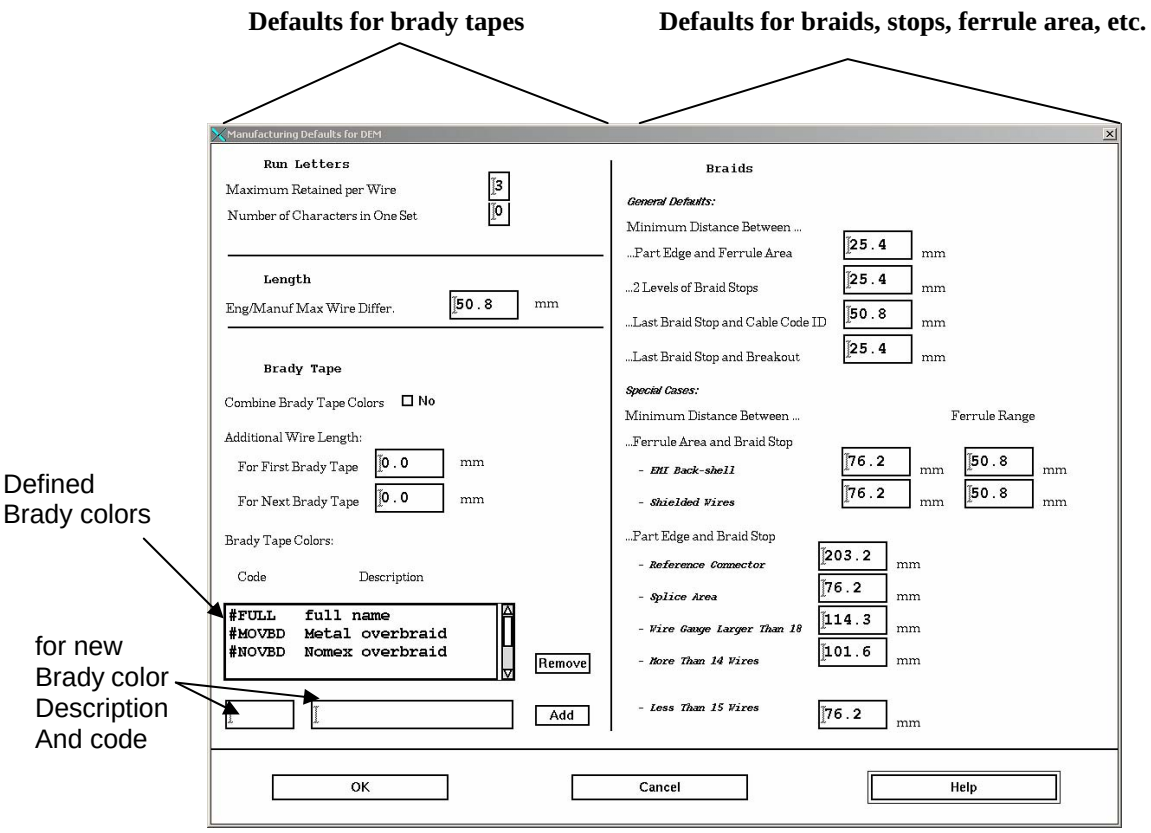
   The **Project Defaults** window appears.



The Project Defaults Window

2. Press **Manufacturing.**

The **Manufacturing Project Defaults** window is displayed:

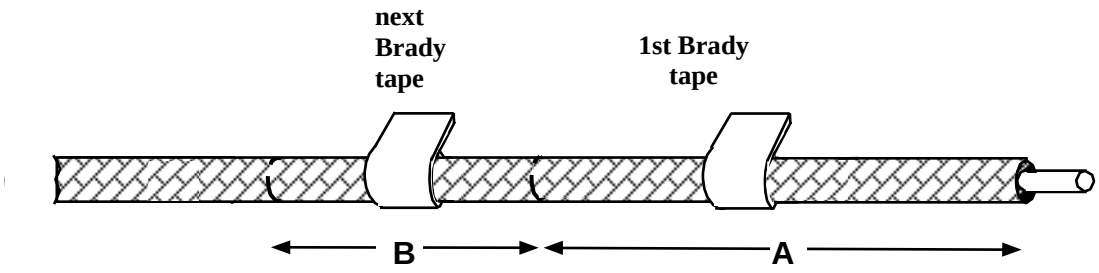


Brady Tape Defaults

3. The left side of the **Manufacturing Project Defaults** screen enables you to define defaults related to Brady tapes, as described below:

Combine Brady Tape Colors	This check box allows you to determine whether more than one Brady tape color can be used on a wire.
Additional Wire Length - For First Brady Tape For Next Brady Tape	The length of wire to be added for the first Brady tape (see **A** below) and each additional Brady tape (see **B** below).

For example, if 1" is to be added for the first Brady tape, and .5" for each additional Brady tape, and the wire has three Brady tapes - a total of 1" + 2 x .5" = 2" should be added to the wire.



Brady Tape Colors: The Brady colors that have already been defined are displayed in the window in this part of the section.

To define a new Brady color: enter the code and description in the two boxes under the window and press the **Add** button.

To remove a defined Brady color: click on it (in the window) and press the **Remove** button.

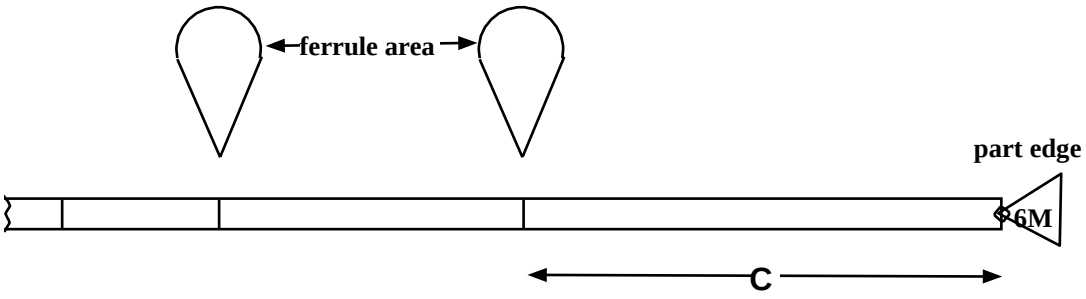
To change a color definition: click on it and press the **Remove** button. The definition is transferred to the boxes under the window. Type over as desired and then press the **Add** Button.

Braid Defaults

4. The right side of the **Manufacturing Project Defaults** screen enables you to define default minimum distances related to braids, as described below. Enter the default values as desired .

There are four General Defaults which describe Minimum Distances.

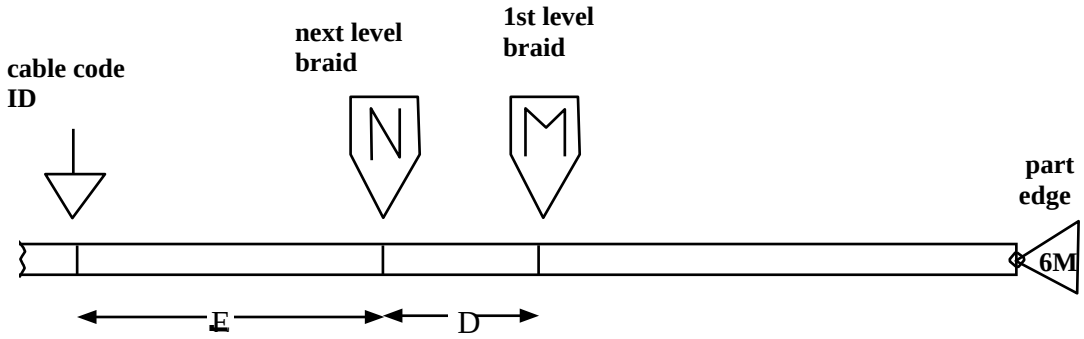
(a) Part Edge and Ferrule Area: the distance between the part edge and the beginning of the ferrule area - see **C.**



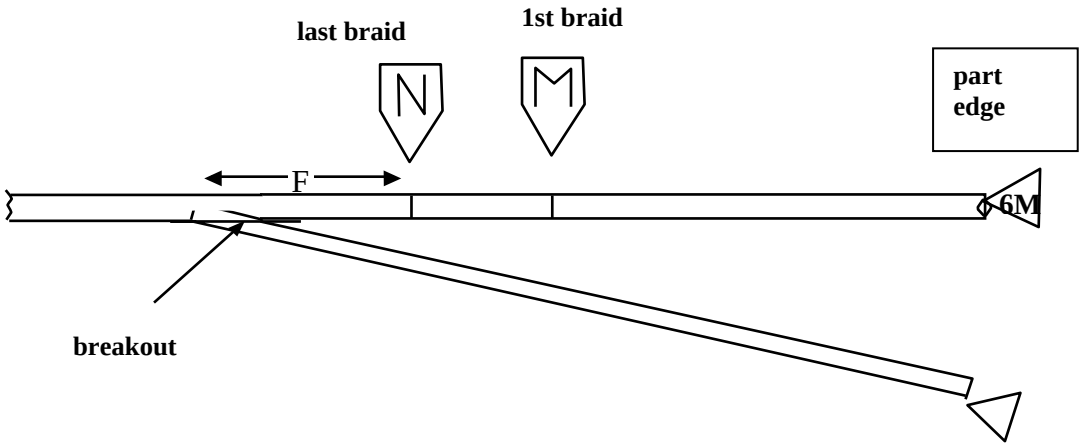
(b) 2 Levels of Braid Stops: the distance between the first and next braid stop - see **D.**

(c) Last Braid Stop and Cable Code ID: the minimum distance between the last braid

stop and the cable code ID - see **E.**



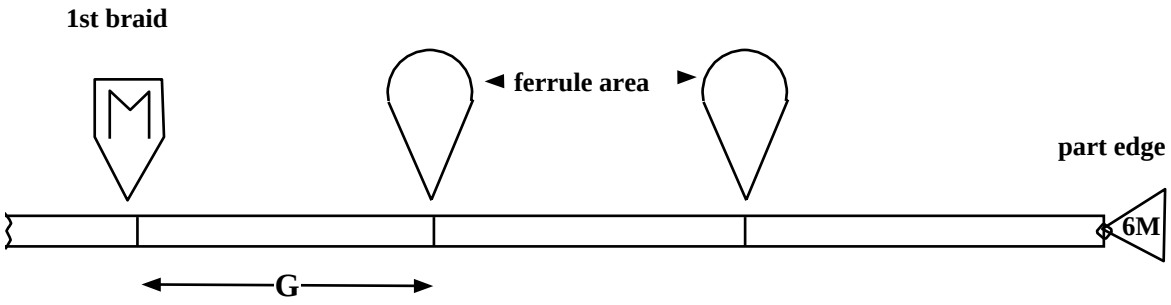
(d) Last Braid Stop and Breakout: the minimum distance between the last braid stop and the breakout point - see **F.**



There are two Special Cases which describe minimum distances.

(e) Ferrule Area and Braid Stop: the minimum distance between the end of the ferrule area and the first braid stop for two specific cases - see **G**:

- if the ferrule is attached to a EMI back-shell
- if the wires are shielded.



(f) Part Edge and Braid Stop: the minimum distance between the part edge and the first braid stop for the following special cases:

- Reference Connector
- Splice Area
- Wire Gauge Larger Than 18
- More than 14 Wires
- Less Than 15 Wires.

5. Press **OK** to save your settings and close the **Manufacturing Project Defaults** window
The **Project Defaults** window returns

6. Press **OK** on Project Defaults window to save your settings and close the Project Defaults window.

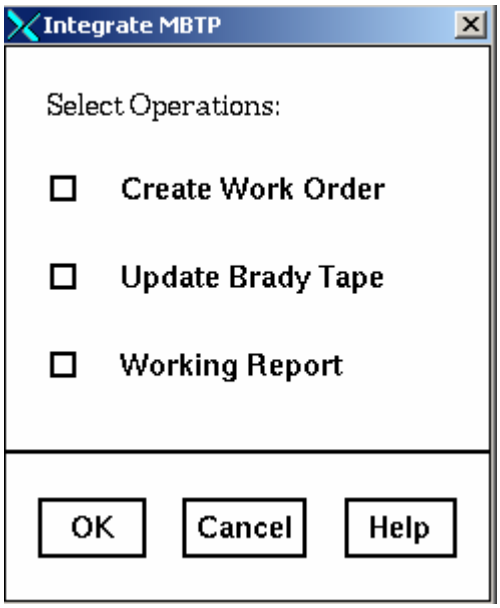
Chapter 2: Integrating an MBTP Package

This chapter shows how to integrate a Manufacturing Build-to-Package (MBTP) document in order to produce a Work Order report which details the procedure to be followed to prepare a bundle.

Operating Instructions

To produce a Work Order file, follow these steps:

1. From the Working Space, select the MBTP document and press the **Integrate** button.
   The program displays the Integrate MBTP window.



The Integrate MBTP Window

There are three options:
- Create Work Order creates a Work Order file. It is always available. This is the standard type of integration.
The two additional buttons are only available ***after*** creating the Work Order file.

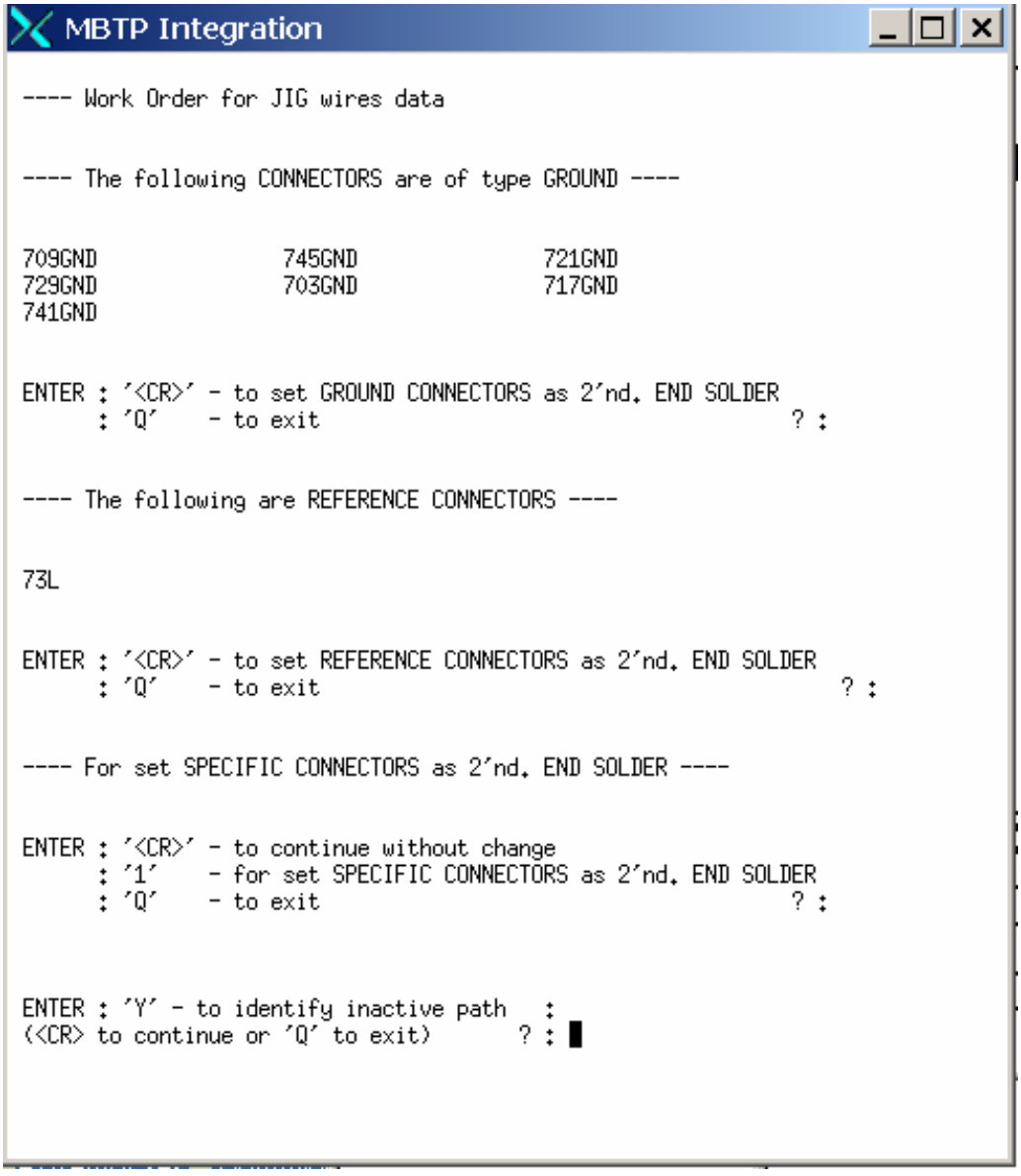
- Update Brady Tape updates the Brady Tape definitions.

- Working Report produces a Working Report that is described later in this chapter.

Creating the Work Order Report

2. Click **Create Work Order** and press **OK**.
The integration process begins and an **MBTP Integration** window detailing the process is opened.

Example:


MBTP Integration
---- Work Order for JIG wires data
---- The following CONNECTORS are of type GROUND ----
709GND 745GND 721GND
729GND 703GND 717GND
741GND
ENTER : '<CR>' - to set GROUND CONNECTORS as 2'nd. END SOLDER
: 'Q' - to exit ? :
---- The following are REFERENCE CONNECTORS ----
73L
ENTER : '<CR>' - to set REFERENCE CONNECTORS as 2'nd. END SOLDER
: 'Q' - to exit ? :
---- For set SPECIFIC CONNECTORS as 2'nd. END SOLDER ----
ENTER : '<CR>' - to continue without change
: '1' - for set SPECIFIC CONNECTORS as 2'nd. END SOLDER
: 'Q' - to exit ? :
ENTER : 'Y' - to identify inactive path :
(<CR> to continue or 'Q' to exit) ? :

Selecting Inactive Paths

Paths to be excluded from the Work Order report are called **inactive paths**. These inactive paths may be manually treated later.

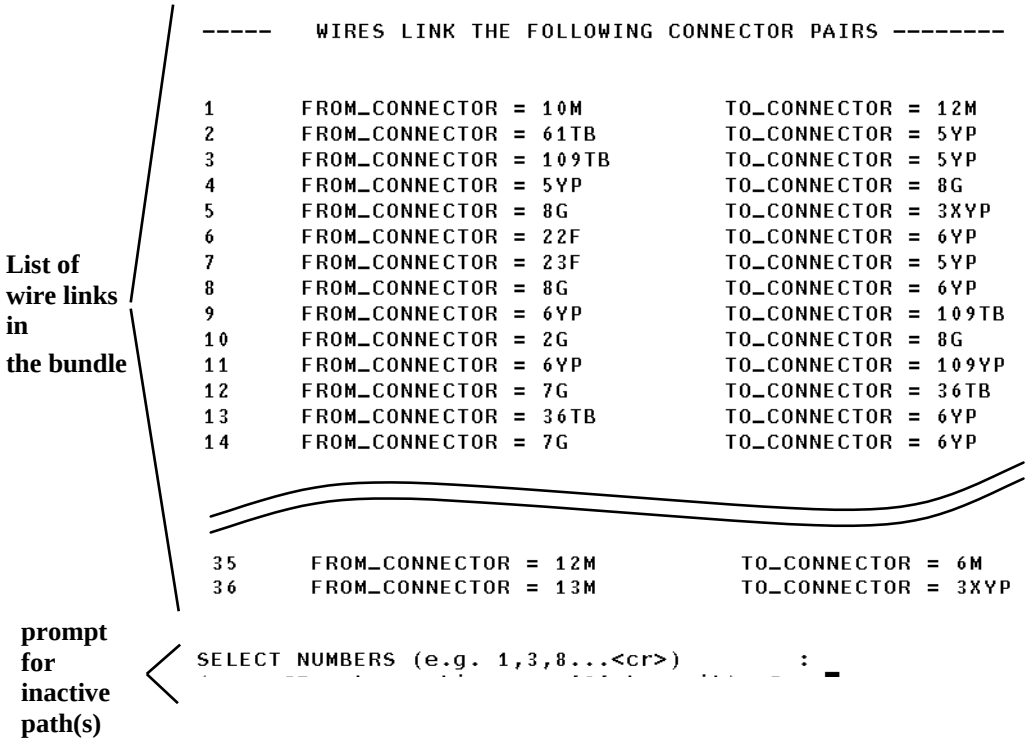
3.

```
ENTER : 'Y' - to identify inactive path   :
(<CR> to continue or 'Q' to exit)      ? : 
```

To continue without selecting inactive paths, press **Enter.** Go to step 5.
To quit without making a Work Order report, press **Q and Enter**.

To select inactive paths, press **Y and Enter.**

You receive a list of Wire Links and a prompt is displayed.


List of wire links in the bundle
prompt for inactive path(s)
----- WIRES LINK THE FOLLOWING CONNECTOR PAIRS --------
1 FROM_CONNECTOR = 10M TO_CONNECTOR = 12M
2 FROM_CONNECTOR = 61TB TO_CONNECTOR = 5YP
3 FROM_CONNECTOR = 109TB TO_CONNECTOR = 5YP
4 FROM_CONNECTOR = 5YP TO_CONNECTOR = 8G
5 FROM_CONNECTOR = 8G TO_CONNECTOR = 3XYP
6 FROM_CONNECTOR = 22F TO_CONNECTOR = 6YP
7 FROM_CONNECTOR = 23F TO_CONNECTOR = 5YP
8 FROM_CONNECTOR = 8G TO_CONNECTOR = 6YP
9 FROM_CONNECTOR = 6YP TO_CONNECTOR = 109TB
10 FROM_CONNECTOR = 2G TO_CONNECTOR = 8G
11 FROM_CONNECTOR = 6YP TO_CONNECTOR = 109YP
12 FROM_CONNECTOR = 7G TO_CONNECTOR = 36TB
13 FROM_CONNECTOR = 36TB TO_CONNECTOR = 6YP
14 FROM_CONNECTOR = 7G TO_CONNECTOR = 6YP
35 FROM_CONNECTOR = 12M TO_CONNECTOR = 6M
36 FROM_CONNECTOR = 13M TO_CONNECTOR = 3XYP
SELECT NUMBERS (e.g. 1,3,8...<cr>) :

4. In response to this prompt, enter the numbers of the paths you want to exclude (the inactive paths) separated by commas and then press **Enter**.
To continue without selecting inactive paths, press **Enter**.
To quit without making a Work Order report, press **Q and Enter**.

Selecting Starting Connectors

5. The following prompt is displayed:

```
ENTER : 'Y' - to select starting connector   :
(<CR> - to program default or 'Q' to exit) ? :
```

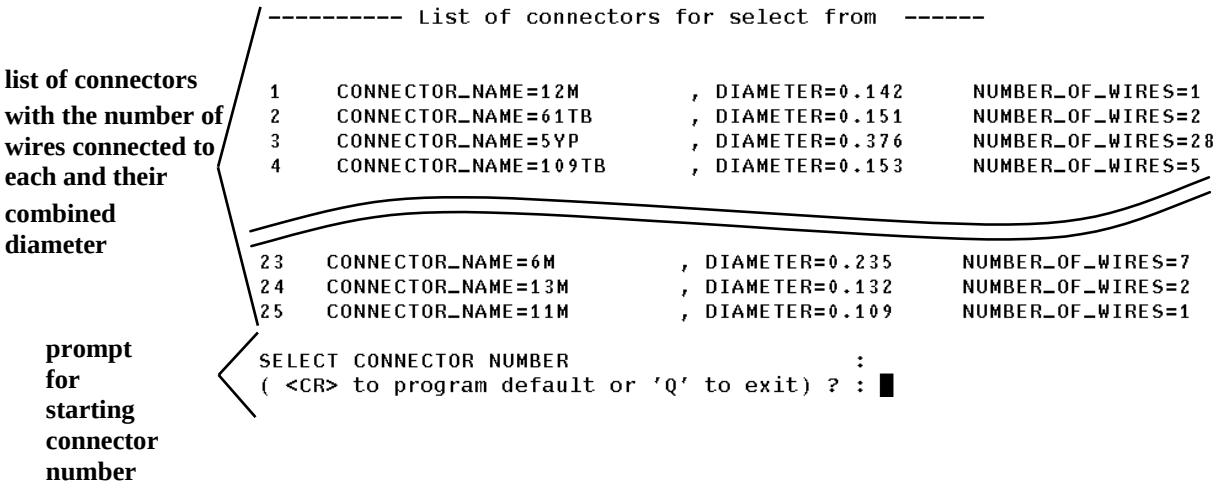
At this point, you can:
- manually select the first end connectors (**Step 6**),
- allow the program to automatically select the starting connectors according to the diameters
- allow the program to automatically select the starting connectors according to the number of wires in them.

To manually select starting connector press 'Y' and Enter. Go to **Step 6**.
To quit without making a Work Order report, press **Q and Enter**.
Press **Enter to continue**.

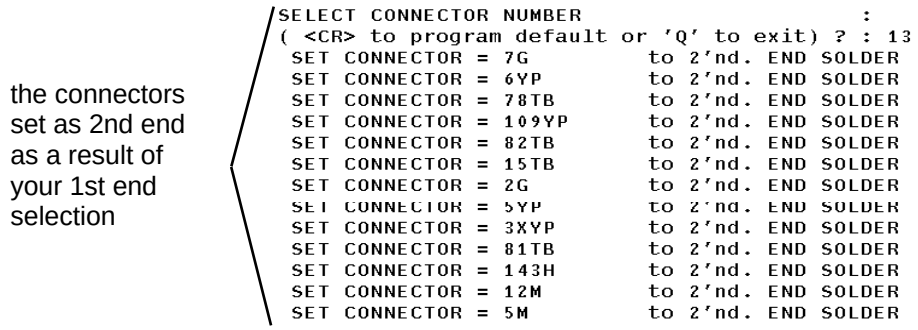
Go to **Step 9**.

Manually Selecting Starting Connectors

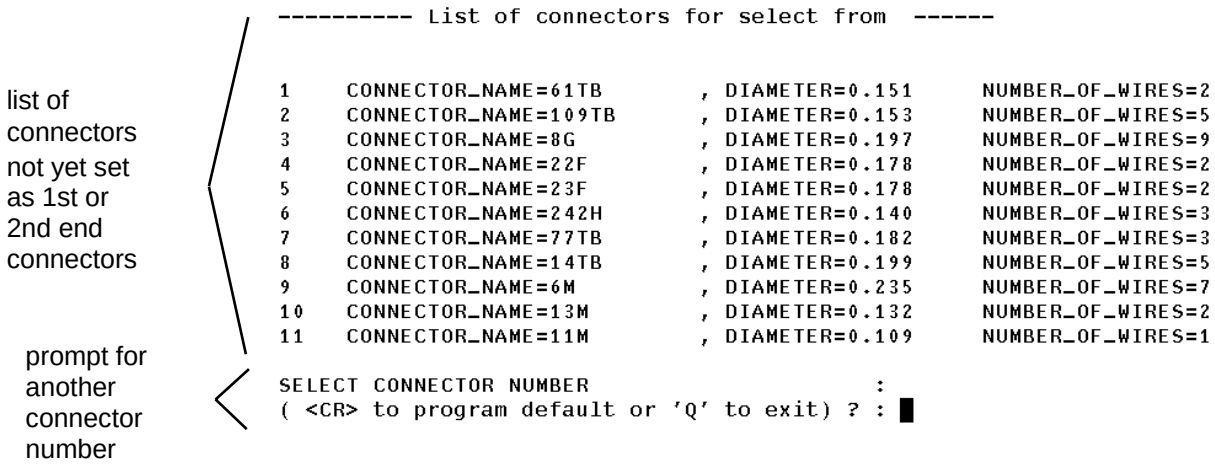
6. A list of connectors and a prompt are displayed:


list of connectors with the number of wires connected to each and their combined diameter
prompt for starting connector number
---------- List of connectors for select from ------
1 CONNECTOR_NAME=12M , DIAMETER=0.142 NUMBER_OF_WIRES=1
2 CONNECTOR_NAME=61TB , DIAMETER=0.151 NUMBER_OF_WIRES=2
3 CONNECTOR_NAME=5YP , DIAMETER=0.376 NUMBER_OF_WIRES=28
4 CONNECTOR_NAME=109TB , DIAMETER=0.153 NUMBER_OF_WIRES=5
23 CONNECTOR_NAME=6M , DIAMETER=0.235 NUMBER_OF_WIRES=7
24 CONNECTOR_NAME=13M , DIAMETER=0.132 NUMBER_OF_WIRES=2
25 CONNECTOR_NAME=11M , DIAMETER=0.109 NUMBER_OF_WIRES=1
SELECT CONNECTOR NUMBER :
(<CR> to program default or 'Q' to exit) ? :

7. In response to the **SELECT CONNECTOR NUMBER prompt:**
To continue without selecting a starting connector (automatic program selection), press **Enter.** You go automatically to **Step 9**.
To quit **without** making a Work Order report, press **Q and Enter.**
Enter the number of a connector you want to set as a starting (first end) connector and press **Enter**. The program now designates the other connectors on the same path as ending terminators (i.e., second end connectors). This process is displayed as in the example below.


the connectors set as 2nd end as a result of your 1st end selection
SELECT CONNECTOR NUMBER :
(<CR> to program default or 'Q' to exit) ? : 13
SET CONNECTOR = 7G to 2'nd. END SOLDER
SET CONNECTOR = 6YP to 2'nd. END SOLDER
SET CONNECTOR = 78TB to 2'nd. END SOLDER
SET CONNECTOR = 109YP to 2'nd. END SOLDER
SET CONNECTOR = 82TB to 2'nd. END SOLDER
SET CONNECTOR = 15TB to 2'nd. END SOLDER
SET CONNECTOR = 2G to 2'nd. END SOLDER
SET CONNECTOR = 5YP to 2'nd. END SOLDER
SET CONNECTOR = 3XYP to 2'nd. END SOLDER
SET CONNECTOR = 81TB to 2'nd. END SOLDER
SET CONNECTOR = 143H to 2'nd. END SOLDER
SET CONNECTOR = 12M to 2'nd. END SOLDER
SET CONNECTOR = 5M to 2'nd. END SOLDER

The remaining connectors (those not yet designated as starting or ending connectors) are displayed to allow you to select another starting connector:


list of connectors not yet set as 1st or 2nd end connectors
prompt for another connector number
---------- List of connectors for select from ------
1 CONNECTOR_NAME=61TB , DIAMETER=0.151 NUMBER_OF_WIRES=2
2 CONNECTOR_NAME=109TB , DIAMETER=0.153 NUMBER_OF_WIRES=5
3 CONNECTOR_NAME=8G , DIAMETER=0.197 NUMBER_OF_WIRES=9
4 CONNECTOR_NAME=22F , DIAMETER=0.178 NUMBER_OF_WIRES=2
5 CONNECTOR_NAME=23F , DIAMETER=0.178 NUMBER_OF_WIRES=2
6 CONNECTOR_NAME=242H , DIAMETER=0.140 NUMBER_OF_WIRES=3
7 CONNECTOR_NAME=77TB , DIAMETER=0.182 NUMBER_OF_WIRES=3
8 CONNECTOR_NAME=14TB , DIAMETER=0.199 NUMBER_OF_WIRES=5
9 CONNECTOR_NAME=6M , DIAMETER=0.235 NUMBER_OF_WIRES=7
10 CONNECTOR_NAME=13M , DIAMETER=0.132 NUMBER_OF_WIRES=2
11 CONNECTOR_NAME=11M , DIAMETER=0.109 NUMBER_OF_WIRES=1
SELECT CONNECTOR NUMBER :
(<CR> to program default or 'Q' to exit) ? :

8. Note: this is a similar list and the same prompt as shown in **Step 6**.

In response to the **SELECT CONNECTOR NUMBER prompt:**
To continue without selecting a starting connector (automatic selection), press **Enter.** You go to **Step 9**.
To quit **without** making a Work Order report, press **Q and Enter.**
Enter the number of another connector you want to set as a starting (first end) connector and press **Enter**.

Repeat **Step 8** above for all the starting connectors you want to specify until the integration is completed.

Go to **Step 12.**

Automatic Selection - By Diameter

9. The following prompt appears:

```
ENTER : '<CR>' - to automatically select connector by diameter          :
      : '1'    - to automatically select connector by number of wires   :
      :('Q'    - to exit)                                              ? :
```

Press **Enter** to automatically select by diameter. Go to **Step 10.**

Press '**1**' and **Enter** to automatically select by number of wires.
Go to **Step 11.**

10. The integration process is performed and detailed in the message window:

integration process

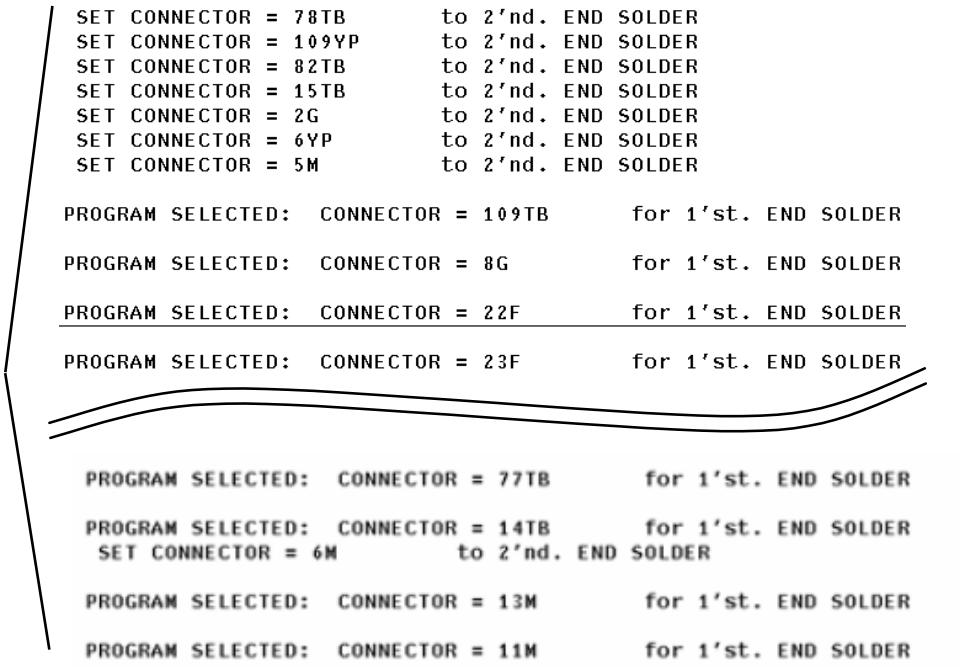
```
PROGRAM SELECTED:  CONNECTOR = 5YP        for 1'st. END SOLDER
 SET CONNECTOR = 23F         to 2'nd. END SOLDER
 SET CONNECTOR = 81TB        to 2'nd. END SOLDER
 SET CONNECTOR = 8G          to 2'nd. END SOLDER
 SET CONNECTOR = 109YP       to 2'nd. END SOLDER
 SET CONNECTOR = 15TB        to 2'nd. END SOLDER
 SET CONNECTOR = 2G          to 2'nd. END SOLDER
 SET CONNECTOR = 82TB        to 2'nd. END SOLDER
 SET CONNECTOR = 78TB        to 2'nd. END SOLDER
 SET CONNECTOR = 6YP         to 2'nd. END SOLDER
 SET CONNECTOR = 5M          to 2'nd. END SOLDER
 SET CONNECTOR = 36TB        to 2'nd. END SOLDER
 SET CONNECTOR = 77TB        to 2'nd. END SOLDER
 SET CONNECTOR = 61TB        to 2'nd. END SOLDER
 SET CONNECTOR = 109TB       to 2'nd. END SOLDER
 SET CONNECTOR = 13M         to 2'nd. END SOLDER
 SET CONNECTOR = 11M         to 2'nd. END SOLDER
 SET CONNECTOR = 6M          to 2'nd. END SOLDER
 SET CONNECTOR = 14TB        to 2'nd. END SOLDER
 SET CONNECTOR = 7G          to 2'nd. END SOLDER
 SET CONNECTOR = 143H        to 2'nd. END SOLDER
```

Go to **Step 12.**

Automatic Selection - By Number of Wires

11. The integration process is performed and detailed in the message window:

integration process


SET CONNECTOR = 78TB to 2'nd. END SOLDER
SET CONNECTOR = 109YP to 2'nd. END SOLDER
SET CONNECTOR = 82TB to 2'nd. END SOLDER
SET CONNECTOR = 15TB to 2'nd. END SOLDER
SET CONNECTOR = 2G to 2'nd. END SOLDER
SET CONNECTOR = 6YP to 2'nd. END SOLDER
SET CONNECTOR = 5M to 2'nd. END SOLDER
PROGRAM SELECTED: CONNECTOR = 109TB for 1'st. END SOLDER
PROGRAM SELECTED: CONNECTOR = 8G for 1'st. END SOLDER
PROGRAM SELECTED: CONNECTOR = 22F for 1'st. END SOLDER
PROGRAM SELECTED: CONNECTOR = 23F for 1'st. END SOLDER
PROGRAM SELECTED: CONNECTOR = 77TB for 1'st. END SOLDER
PROGRAM SELECTED: CONNECTOR = 14TB for 1'st. END SOLDER
SET CONNECTOR = 6M to 2'nd. END SOLDER
PROGRAM SELECTED: CONNECTOR = 13M for 1'st. END SOLDER
PROGRAM SELECTED: CONNECTOR = 11M for 1'st. END SOLDER

Go to **Step 12.**

End of Integration Process

12. The integration process is detailed in the message window :

```
See Work order on file=/usr/users/disk23/wolgro/harness/CHK/
private/25w-MBTP-1101-888_work_order.wrk

ENTER: 'C' –FOR COMMIT 'S'- TO STOP (D.B. Updating)   ?
```

13. Validate the Work order file.
Press **C** (Commit) and **Enter** to update the databases.

14.

```
---- END of OPERATION  ----


--- CREATE_WORK_ORDER: Process terminated o.k.

   To close window type <CR>
```

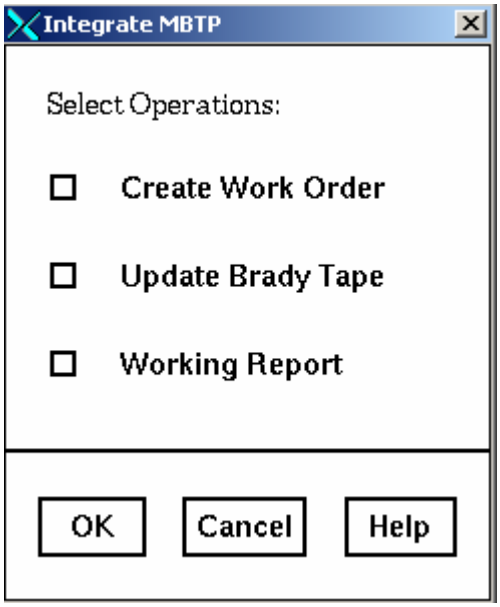
Press **Enter** to close the message window.

Note: In your private directory in addition to the Work Order file you will find a Log file detailing errors encountered during the integration process.

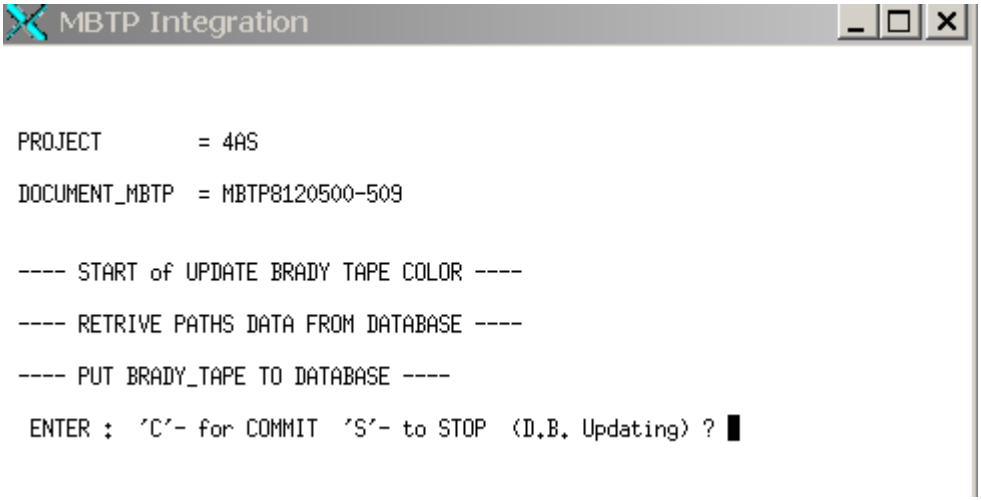
Printed for reference only

Updating Brady Tape Definitions

To update the Brady Tape definitions after creating the Work order file, choose ***Update Brady Tape*** in the **Integrate MBTP** window and press **OK**.

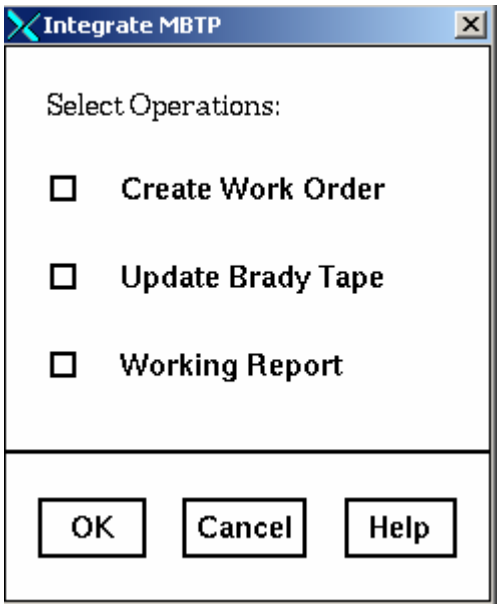


Below is an example of the message window that is opened.


MBTP Integration
PROJECT = 4AS
DOCUMENT_MBTP = MBTP8120500-509
---- START of UPDATE BRADY TAPE COLOR ----
---- RETRIVE PATHS DATA FROM DATABASE ----
---- PUT BRADY_TAPE TO DATABASE ----
ENTER : 'C'- for COMMIT 'S'- to STOP (D.B. Updating) ?

Creating a Working Report

To generate a Working Report containing the information displayed in the Manufacturing Methods window choose ***Working Report*** in the **Integrate MBTP** window. The program generates the report.



Below is an example of the message window that is opened.

```
PROJECT         = CHK
DOCUMENT_MBTP   = CHK-MBTP-1301-001


--- WORK_ORDER_REPORT: Process terminated o.k.

    See report CHK-MBTP-1301-001.rep in your private directory
  To close window type <CR>
```

Error Messages

Below is a list of error messages that you may receive when producing this report. The second line of each error tells you what to do to fix the problem.

ERROR: Can't get names and issues of MBTP source documents.
--------- Check existence of source documents and their issues in database.

ERROR: Can't get document notes of MBTP.
--------- Check notes associated with MBTP document in database.

ERROR: Can't get released source BTP notes.
--------- Check notes associated with MBTP document in database.

ERROR: Can't get released Engineering Wire List source document.
--------- Check existence of Engineering wire list in database.

ERROR: Can't read Engineering Wire List from released file.
--------- Check released file of Engineering Wire List for errors.

ERROR: Can't read Part List source document.
--------- Check existence of Part List in database.

ERROR: Can't read Part List from released file.
--------- Check released file of Part List for errors.

ERROR: Can't get Work Process document.
--------- Check issues of Manufacturing Wire List in database.

ERROR: Can't get Manufacturing Wire List document.
--------- Check issues of Manufacturing Wire List in database.

ERROR: Can't retrieve paths, nodes and segments from database.
--------- Check with your DBA.

ERROR: Can't create Manufacturing Wire List.
--------- Check existence of Manufacturing Wire List in database.

ERROR: Can't open report file.
--------- Check with your DBA.

ERROR: Can't open global notes of released MBTP.
--------- Check notes associated with MBTP document in database.

ERROR: Can't create Banner Page for MBTP reports.
--------- Check with your DBA.

ERROR: Can't create 1st or 2nd end terminator reports
--------- Check with your DBA.

ERROR: Can't create Index Pages
--------- Check with your DBA.

The Work Order Report

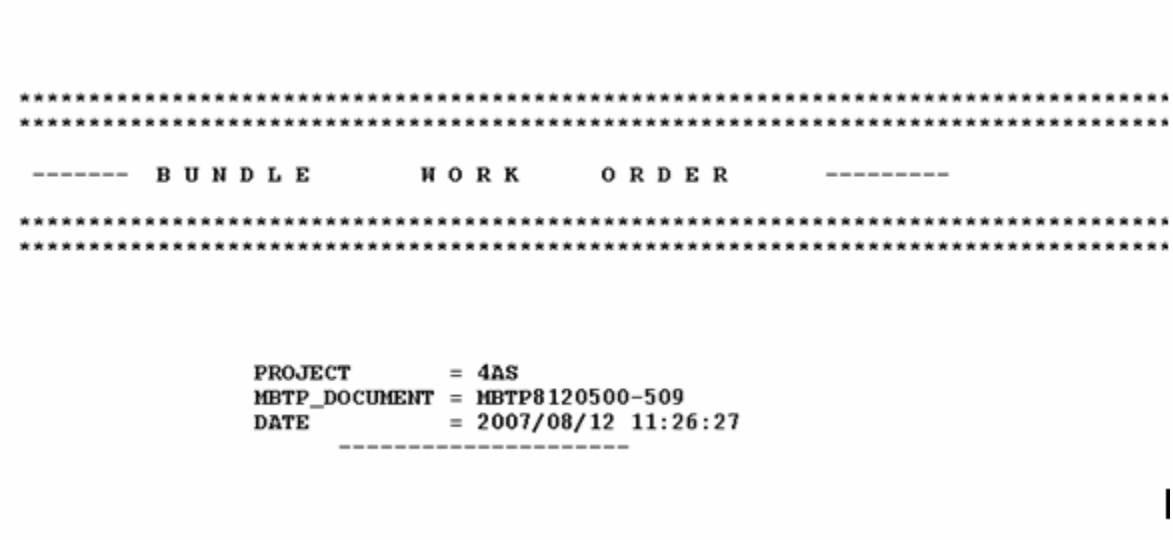
The Work Order report is composed of a banner page and the following five sections:

- Twist Sequence,
- List of 1st End Solders,
- List of 2nd End Solders,
- List of Wires Not Connected at Either End,
- Wires Link the Following Connector Pairs.

and details the information for each section.

Banner Page

Each Work Order file is prefaced by a banner page which presents general information concerning the bundle, including: Project name, MBTP Document name and the date the file was created (see example below).



Work Order File - Banner Page

Section 1: Twist Sequence

The Twist Sequence section of the Work Order file is divided into two parts. The first part presents the sequence in which the segments should be twisted, in short format - only the order that the segments should be twisted is described. The segments of the main path are first detailed and then those of each sub path in the bundle. The second part presents the same twist sequence but also details the wires in the various segments (see examples below).

In the short format, the following details are presented for each segment:

- Segment name,
- Starting node number,
- End node number,
- Number of cables in the segment.

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

 -------  T W I S T     S E Q U E N C E    (short format)     ---------

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------



=== START_MAIN_PATH     BEGIN_PART_NAME = 5YP            COIL_NO      = 1
                                                         BRAID_COLOR  = 10WH
1       SEG_NAME = #B1          FROM_NODE = 203          TO_NODE      = 7
                                                         NO_CABLES    = 26
2       SEG_NAME = #B2          FROM_NODE = 7            TO_NODE      = 443
                                                         NO_CABLES    = 1
3       SEG_NAME = #B60         FROM_NODE = 443          TO_NODE      = 241
                                                         NO_CABLES    = 1
4       SEG_NAME = #B61         FROM_NODE = 241          TO_NODE      = 51
                                                         NO_CABLES    = 1
5       SEG_NAME = #B62         FROM_NODE = 51           TO_NODE      = 15
                                                         NO_CABLES    = 1
--- END_MAIN_PATH          END_PART_NAME = 23F           COIL_NO      = 2
                                                         BRAID_COLOR  = 12YL

  ***** START SUB PATH  BEGIN_NODE_NAME = 7

6       SEG_NAME = #B3          FROM_NODE = 7            TO_NODE      = 17
                                                         NO_CABLES    = 26
7       SEG_NAME = #B5          FROM_NODE = 17           TO_NODE      = 23
                                                         NO_CABLES    = 2
  ..... END   SUB PATH    END_PART_NAME = 81TB           COIL_NO      = 3
                                                         BRAID_COLOR  = 13YL


=== START_MAIN_PATH     BEGIN_PART_NAME = 12M            COIL_NO      = 25
                                                         BRAID_COLOR  = 2WH
40      SEG_NAME = #B15         FROM_NODE = 133          TO_NODE      = 127
                                                         NO_CABLES    = 1
41      SEG_NAME = #B17         FROM_NODE = 127          TO_NODE      = 163
                                                         NO_CABLES    = 0
--- END_MAIN_PATH          END_PART_NAME = 10M           COIL_NO      = 26
                                                         BRAID_COLOR  = 4WH
```

Section 1: Twist Sequence - Short Format

In the full format, the following information is detailed for each segment:

BEGIN_PART_NAME	The part designator of the 1st end connector.
COIL_NO	The coil number of the segment.
BRADY-TAPE COLOR	The Brady tape color.
SEG_NAME	The name of the segment.
FROM_NODE	The node where the segment starts.
TO_NODE	The node where the segment end.
NO_CABLES	The number of cables in the segment, where a *cable* is a lone wire or a distinct group of wires (e.g., twisted or shielded together).

In the full format, the following information is detailed for each wire:

WIRE_NAME	The name/number of the wire
TO_PART	The part designator of the ending connector.
TO_BRADY-TAPE COLOR	The Brady tape color of the ending connector.
GA/TY	The gauge and type of wire.
S1, S2, S3	The twist or shield family to which the wire belongs

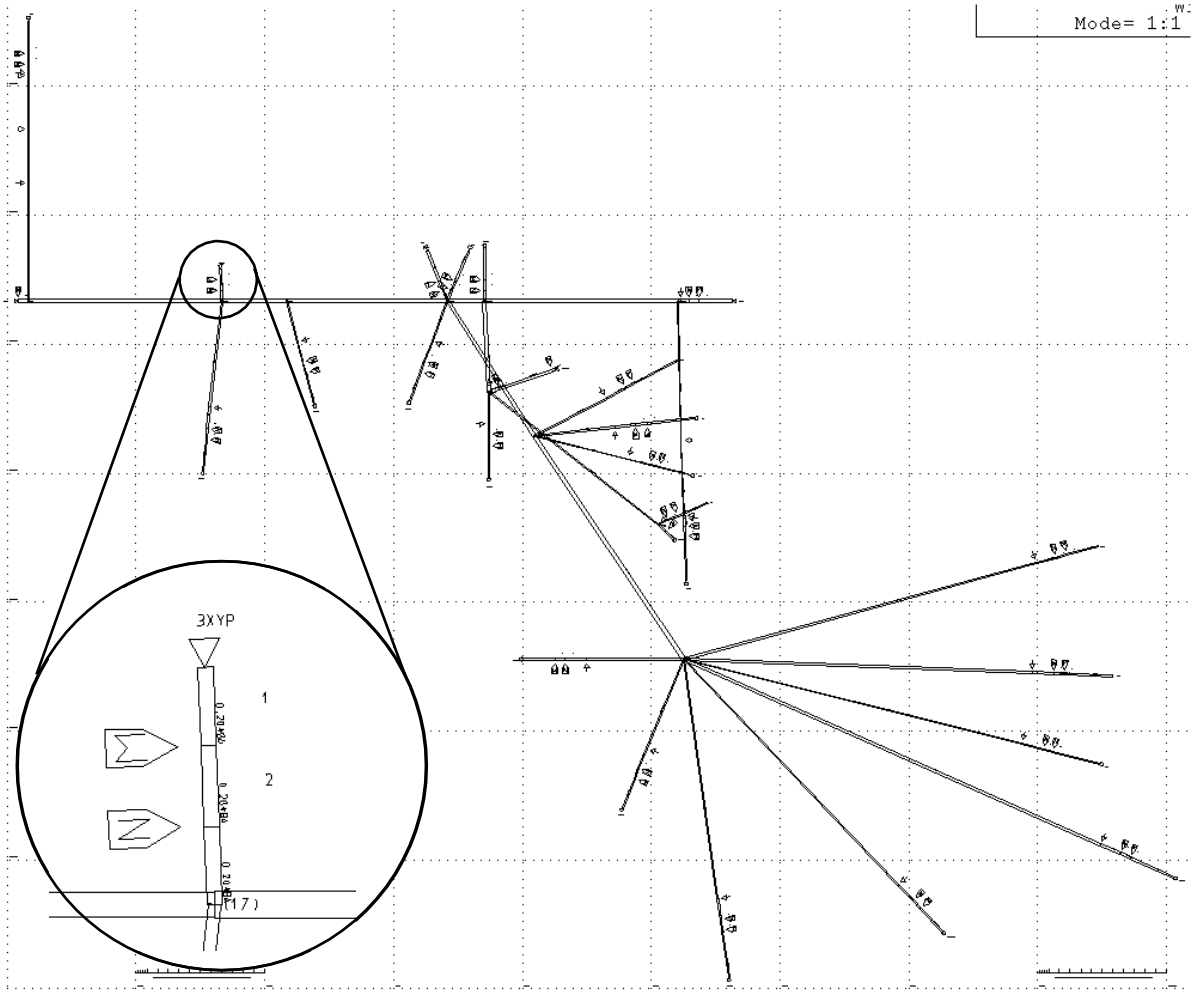
.

```
-------  T W I S T     S E Q U E N C E   (full format)   ---------

--------------------------------------------------------------------------------
--------------------------------------------------------------------------------


=== START_MAIN_PATH     BEGIN_PART_NAME = 5YP             COIL_NO      = 1
                                                          BRAID_COLOR  = 10WH
1       SEG_NAME = #B1          FROM_NODE = 203           TO_NODE      = 7
                                                          NO_CABLES    = 26
    WIRE_NAME      TO_PART        TO_BRAID_COLOR    GA/TY      S1   S2 S3
  ------------------------------------------------------------------------
 C0000000459E     61TB                2YL           18 A A
 C0000000460E     61TB                2YL           18 A A
 CF000000405B     109TB               3YL           24 B A
 D0000000032A     8G                  12WH          24 A A
 F0000000185A     8G                  12WH          24 A A
 G0000000001C     8G                  12WH          24 A A
 L0000000003E     36TB                9WH           24 A A
 L0000000008D     36TB                9WH           24 A A
 L0000000109C     109YP               11WH          18 A A
 L0000000126T     109YP               11WH          22 A A
 L0000000220D     109YP               11WH          24 A A
 L0000000221C     109YP               11WH          22 A A
 L0000000223C     109YP               11WH          22 A A
 L0000000225C     109YP               11WH          22 A A
 L0000000229C     109YP               11WH          22 A A
 L0000000230C     109YP               11WH          22 A A
 L0000000269C     109YP               11WH          24 A A
 M0000000001C     15TB                6WH           20 A A
 M0000000003C     15TB                6WH           20 A A
 M0000000005C     5M                  3WH           24 A A
 M0000000007D     5M                  3WH           18 A A
 M0000000009C     13M                 6YL           20 A A
 M000000014D      5M                  3WH           18 A A
```

see illustration on next page

```
=== START_MAIN_PATH     BEGIN_PART_NAME = 3XYP            COIL_NO      = 23
                                                          BRAID_COLOR  = 13WH
38      SEG_NAME = #B4          FROM_NODE = 1             TO_NODE      = 17
                                                          NO_CABLES    = 8
    WIRE_NAME      TO_PART        TO_BRAID_COLOR    GA/TY      S1   S2 S3
  ------------------------------------------------------------------------
 D0000000033A     8G                  12WH          24 A A
 F0000000186A     8G                  12WH          24 A A
 G0000000036A     7G                  10YL          24 A A
 G0000000102A     7G                  10YL          24 A A
 L0000000111A     109YP               11WH          22 A A
 L0000000250A     109YP               11WH          22 A A
 M0000000028A     13M                 6YL           20 A A
 W0000000089A     8G                  12WH          20 A A


=== START_MAIN_PATH     BEGIN_PART_NAME = 242H            COIL_NO      = 24
                                                          BRAID_COLOR  = 8YL
39      SEG_NAME = #B9          FROM_NODE = 37            TO_NODE      = 43
                                                          NO_CABLES    = 1
    WIRE_NAME      TO_PART        TO_BRAID_COLOR    GA/TY      S1   S2 S3
  ------------------------------------------------------------------------
 H0000000212D     78TB                11YL          24 A C     003
 H0000000213E     82TB                7YL           24 A C     003
 H0000000425A     78TB                11YL          24 A C     003


=== START_MAIN_PATH     BEGIN_PART_NAME = 12M             COIL_NO      = 25
                                                          BRAID_COLOR  = 2WH
40      SEG_NAME = #B15         FROM_NODE = 133           TO_NODE      = 127
                                                          NO CABLES    = 1
41      SEG_NAME = #B17         FROM_NODE = 127           TO_NODE      = 163
                                                          NO_CABLES    = 0
--- END_MAIN_PATH          END_PART_NAME = 10M            COIL_NO      = 26
                                                          BRAID_COLOR  = 4WH
```

Section 1: Twist Sequence - Full Format


Mode= 1:1
3XYP
1
2
(17)

Section 2: List of 1st End Solder

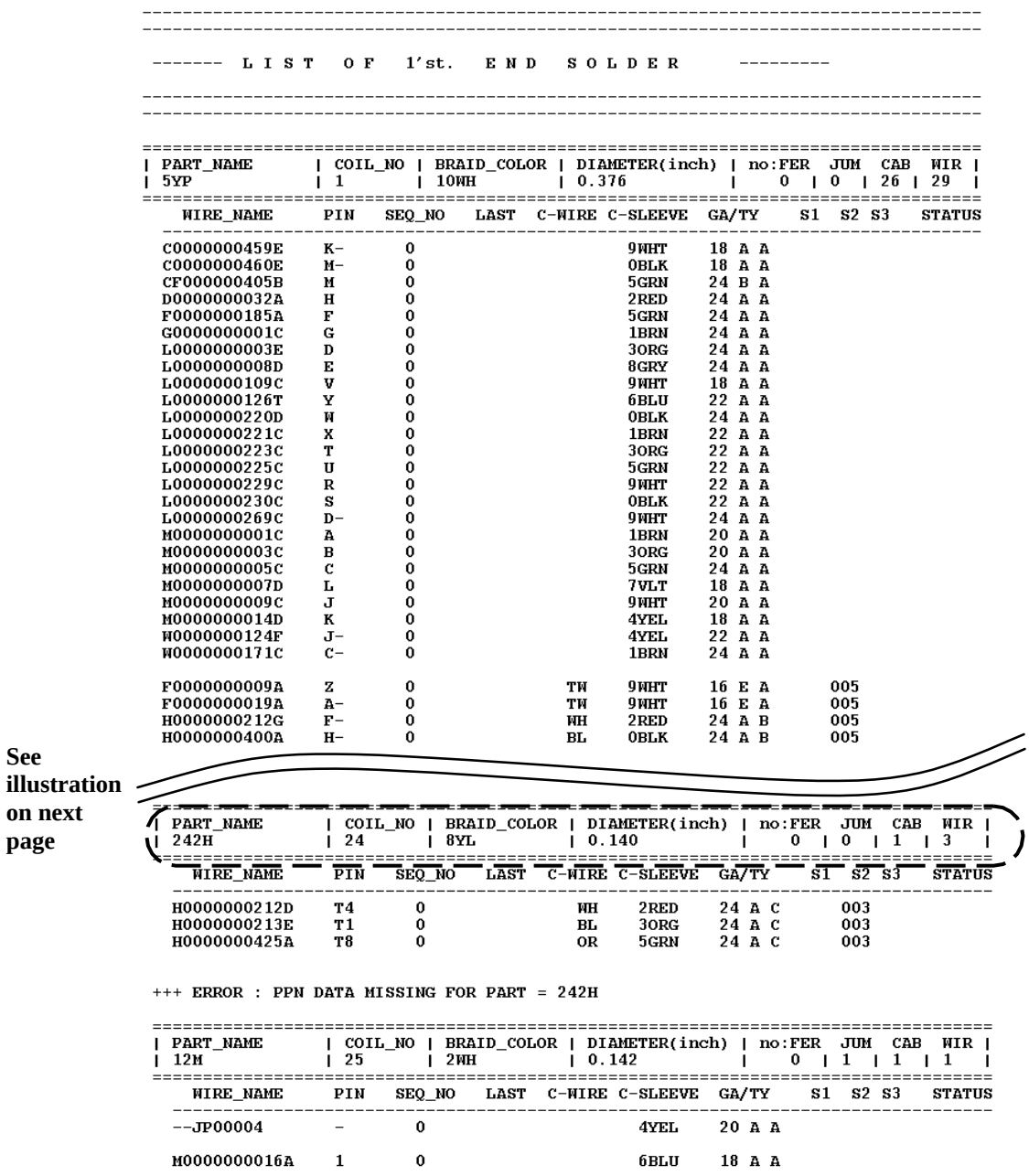
The List of 1st End Solder section of the Work Order file details the starting (first end) connectors. The connections described in this section should be made before assembling the jig.

The following information is detailed for each 1st end connector:

PART NAME	The part designator of the 1st end connector.
COIL_NO	The coil number of the segment.
BRADY-TAPE COLOR	The Brady tape color.
DIAMETER	The combined diameter of all the wires connected to the 1st end connector.
no: FER	The number of ferrules attached to the 1st end connector.
no: JUM	The number of jumpers attached to the 1st end connector.
no: CAB	The number of cables attached to the 1st end connector.
no: WIR	The number of wires attached to the 1st end connector.

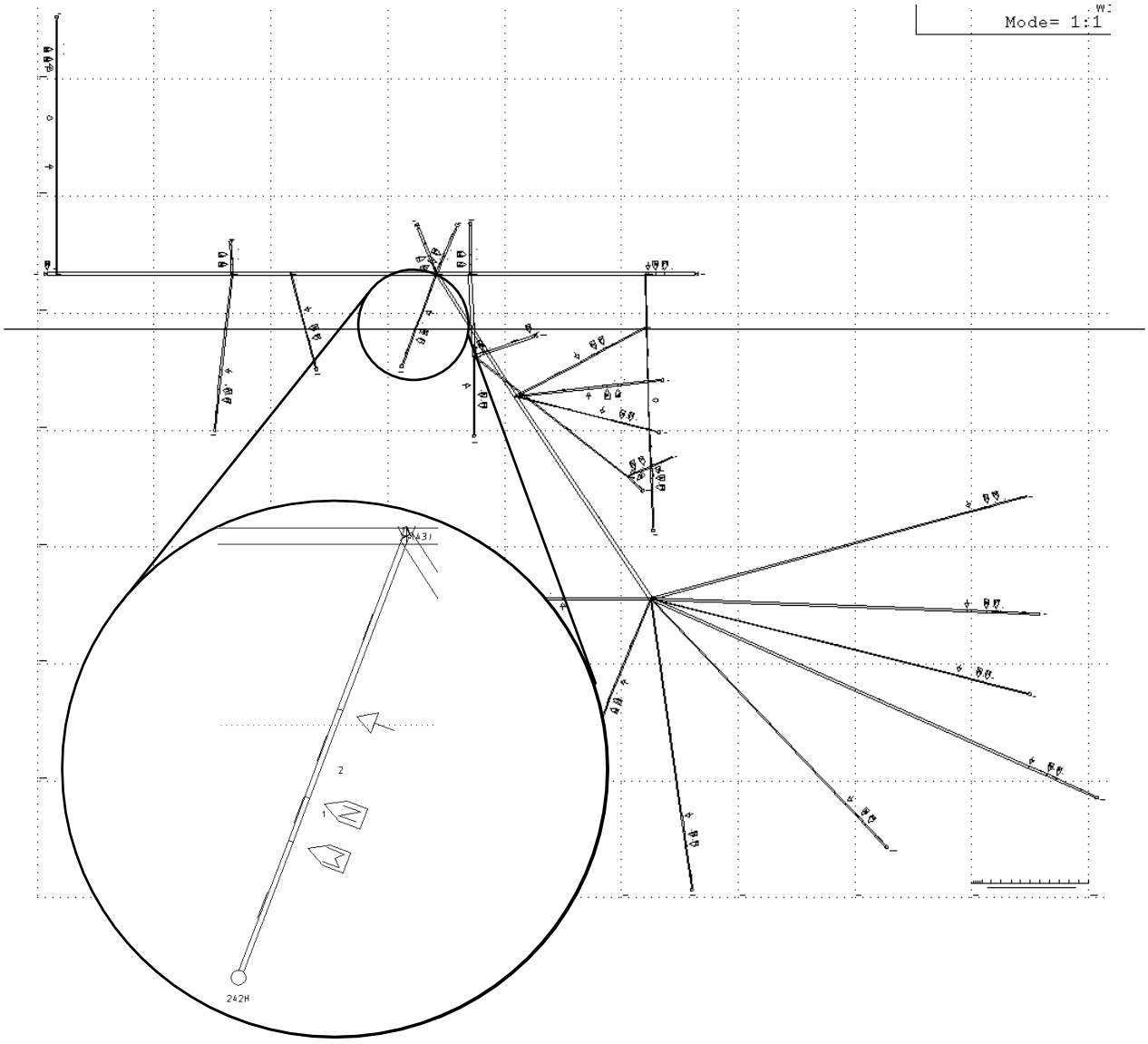
The following information is detailed for each wire connected to a 1st end connector:

WIRE_NAME	The name/number of the wire
PIN	The 1st end connector pin number to which the wire is connected.
SEQ_NO	The sequence number of the wire (soldering sequence).
LAST	
C-WIRE	The insulation color of the wire.
C-SLEEVE	The color of the sleeve around the wire.
GA/TY	The gauge/type of wire.
S1, S2, S3	The twist or shield family to which the wire belongs.
STATUS	



```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

 -------  L I S T   O F   1'st.   E N D   S O L D E R      ---------

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

================================================================================
| PART_NAME      | COIL_NO | BRAID_COLOR | DIAMETER(inch) | no:FER  JUM  CAB  WIR |
| 5YP            | 1       | 10WH        | 0.376          |    0  | 0  | 26 | 29  |
================================================================================
   WIRE_NAME     PIN   SEQ_NO   LAST  C-WIRE C-SLEEVE  GA/TY    S1  S2 S3   STATUS
 --------------------------------------------------------------------------------
 C0000000459E    K-      0                    9WHT    18 A A
 C0000000460E    M-      0                    0BLK    18 A A
 CF000000405B    M       0                    5GRN    24 B A
 D0000000032A    H       0                    2RED    24 A A
 F0000000185A    F       0                    5GRN    24 A A
 G0000000001C    G       0                    1BRN    24 A A
 L0000000003E    D       0                    3ORG    24 A A
 L0000000008D    E       0                    8GRY    24 A A
 L0000000109C    V       0                    9WHT    18 A A
 L0000000126T    Y       0                    6BLU    22 A A
 L0000000220D    W       0                    0BLK    24 A A
 L0000000221C    X       0                    1BRN    22 A A
 L0000000223C    T       0                    3ORG    22 A A
 L0000000225C    U       0                    5GRN    22 A A
 L0000000229C    R       0                    9WHT    22 A A
 L0000000230C    S       0                    0BLK    22 A A
 L0000000269C    D-      0                    9WHT    24 A A
 M0000000001C    A       0                    1BRN    20 A A
 M0000000003C    B       0                    3ORG    20 A A
 M0000000005C    C       0                    5GRN    24 A A
 M0000000007D    L       0                    7VLT    18 A A
 M0000000009C    J       0                    9WHT    20 A A
 M0000000014D    K       0                    4YEL    18 A A
 W0000000124F    J-      0                    4YEL    22 A A
 W0000000171C    C-      0                    1BRN    24 A A

 F0000000009A    Z       0               TW   9WHT    16 E A      005
 F0000000019A    A-      0               TW   9WHT    16 E A      005
 H0000000212G    F-      0               WH   2RED    24 A B      005
 H0000000400A    H-      0               BL   0BLK    24 A B      005

See illustration on next page

================================================================================
| PART_NAME      | COIL_NO | BRAID_COLOR | DIAMETER(inch) | no:FER  JUM  CAB  WIR |
| 242H           | 24      | 8YL         | 0.140          |    0  | 0  | 1  | 3   |
================================================================================
   WIRE_NAME     PIN   SEQ_NO   LAST  C-WIRE C-SLEEVE  GA/TY    S1  S2 S3   STATUS
 --------------------------------------------------------------------------------
 H0000000212D    T4      0               WH   2RED    24 A C      003
 H0000000213E    T1      0               BL   3ORG    24 A C      003
 H0000000425A    T8      0               OR   5GRN    24 A C      003

+++ ERROR : PPN DATA MISSING FOR PART = 242H

================================================================================
| PART_NAME      | COIL_NO | BRAID_COLOR | DIAMETER(inch) | no:FER  JUM  CAB  WIR |
| 12M            | 25      | 2WH         | 0.142          |    0  | 1  | 1  | 1   |
================================================================================
   WIRE_NAME     PIN   SEQ_NO   LAST  C-WIRE C-SLEEVE  GA/TY    S1  S2 S3   STATUS
 --------------------------------------------------------------------------------
 --JP00004       -       0                    4YEL    20 A A

 M0000000016A    1       0                    6BLU    18 A A
```

Section 2: List of 1st End Solder


Mode= 1:1
242H

Section 3: List of 2nd End Solder

The List of 2nd End Solder section of the Work Order file details the second end connectors. After performing the first end connections described in the previous section, the connections described in this section should be made as the jig is assembled.

The following information is detailed for each 2nd end connector:

PART NAME	The part designator of the 2nd end connector.
COIL_NO	The coil number of the segment
BRADY-TAPE COLOR	The color of the braid.
DIAMETER	The combined diameter of all the wires connected to the 2nd end connector.
no: FER	The number of ferrules attached to the 2nd end connector.
no: JUM	The number of jumpers attached to the 2nd end connector.
no: CAB	The number of cables attached to the 2nd end connector.
no: WIR	The number of wires attached to the 2nd end connector

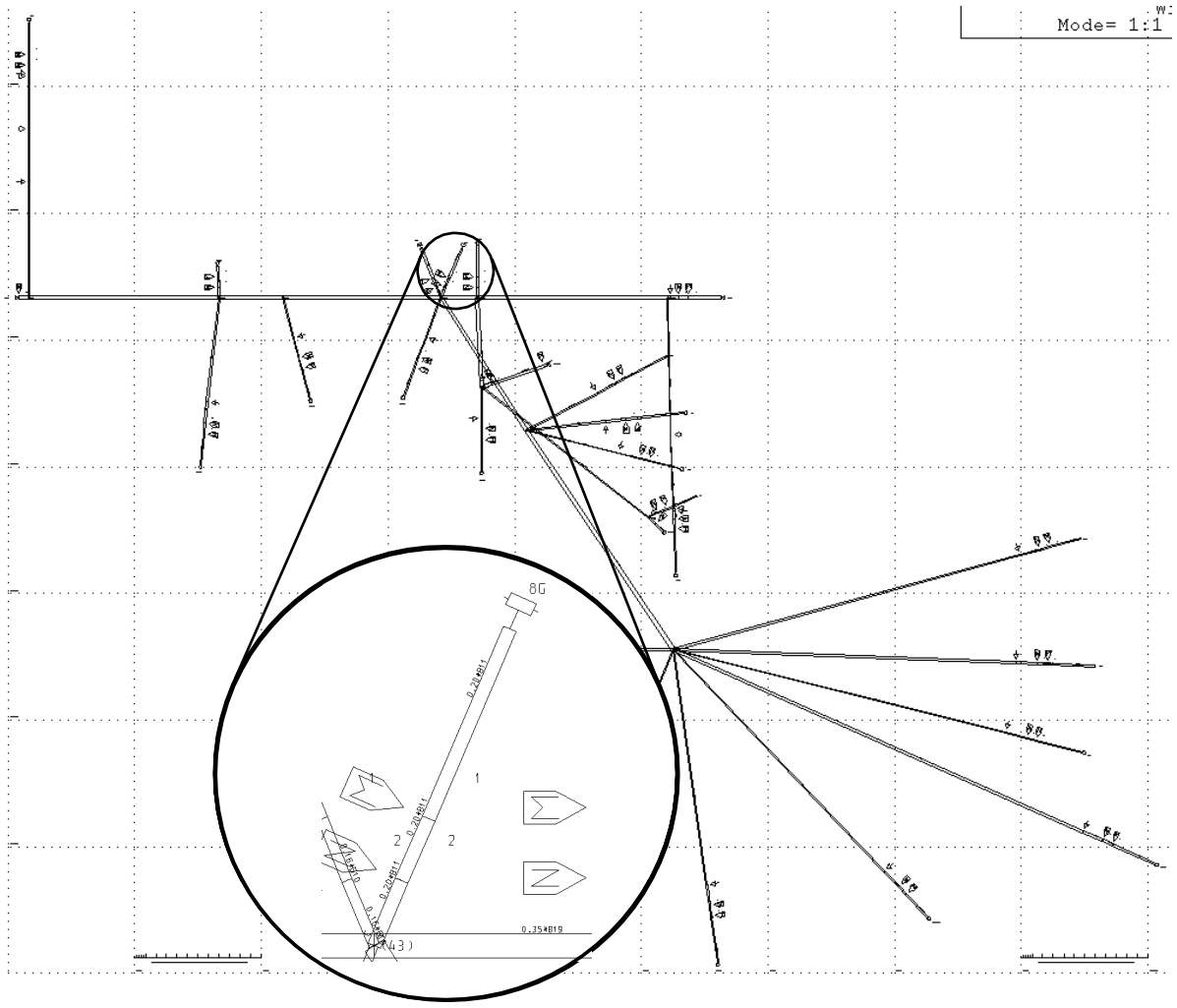
The following information is detailed for each wire connected to a 2nd end connector:

WIRE_NAME	The name/number of the wire
PIN	The 1st end connector pin number to which the wire is connected.
SEQ_NO	The sequence number of the wire (soldering sequence).
LAST	
C-WIRE	The insulation color of the wire.
C-SLEEVE	The color of the sleeve around the wire.
GA/TY	The gauge/type of wire.
S1, S2, S3	The twist or shield family to which the wire belongs.
STATUS	

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

 -------  L I S T   O F   2'nd.   E N D   S O L D E R      ---------

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

================================================================================
| PART_NAME      | COIL_NO | BRAID_COLOR | DIAMETER(inch) | no:FER  JUM  CAB  WIR |
| 23F            | 2       | 12YL        | 0.178          |     0  | 0  | 1  | 2   |
================================================================================
   WIRE_NAME     PIN   SEQ_NO   LAST  C-WIRE C-SLEEVE  GA/TY    S1  S2 S3   STATUS
  ------------------------------------------------------------------------------
  F0000000009A   +       0               TW    9WHT    16 E A      005
  F0000000019A   -       0               TW    9WHT    16 E A      005

+++ ERROR : PPN DATA MISSING FOR PART = 23F

================================================================================
| PART_NAME      | COIL_NO | BRAID_COLOR | DIAMETER(inch) | no:FER  JUM  CAB  WIR |
| 81TB           | 3       | 13YL        | 0.182          |     0  | 0  | 1  | 2   |
================================================================================
   WIRE_NAME     PIN   SEQ_NO   LAST  C-WIRE C-SLEEVE  GA/TY    S1  S2 S3   STATUS
  ------------------------------------------------------------------------------
  H0000000400E   S001    0               BL    0BLK    24 A C      004

  H0000000400A   S001    0               BL    0BLK    24 A B      005

+++ ERROR : PPN DATA MISSING FOR PART = 81TB

================================================================================
| PART_NAME      | COIL_NO | BRAID_COLOR | DIAMETER(inch) | no:FER  JUM  CAB  WIR |
| 8G             | 4       | 12WH        | 0.197          |     0  | 0  | 9  | 9   |
================================================================================
   WIRE_NAME     PIN   SEQ_NO   LAST  C-WIRE C-SLEEVE  GA/TY    S1  S2 S3   STATUS
  ------------------------------------------------------------------------------
  D0000000032A   L       0                   2RED    24 A A
  D0000000033A   N       0                   3ORG    24 A A
  F0000000014A   R       0                   4YEL    24 A A
  F0000000185A   H       0                   5GRN    24 A A
  F0000000186A   K       0                   6BLU    24 A A
  G0000000001C   V       0                   1BRN    24 A A
  G0000000002A   T       0                   2RED    24 A A
  W0000000089A   S       0                   9WHT    20 A A
  W0000000092A   P       0                   2RED    24 A A

================================================================================
| PART_NAME      | COIL_NO | BRAID_COLOR | DIAMETER(inch) | no:FER  JUM  CAB  WIR |
| 143H           | 22      | 9YL         | 0.140          |     0  | 0  | 1  | 3   |
================================================================================
   WIRE_NAME     PIN   SEQ_NO   LAST  C-WIRE C-SLEEVE  GA/TY    S1  S2 S3   STATUS
  ------------------------------------------------------------------------------
  H0000000212H   T4      0               WH    2RED    24 A C      004
  H0000000400E   T1      0               BL    0BLK    24 A C      004
  H0000000426A   T8      0               OR    6BLU    24 A C      004
```

see illustration on next page

Section 3: List of 2nd End Solder


Mode= 1:1
80
1
2
2
0.354819

Section 4: List of Wires Not Connected at Either End

This section of the Work Order file describes the wires for which both connectors have been defined as the second end connector (determined by the software or by the user). These are the wires that cannot be attached to connectors at either end before assembling the bundle on the jig.

The following information is detailed for each wire in this section:

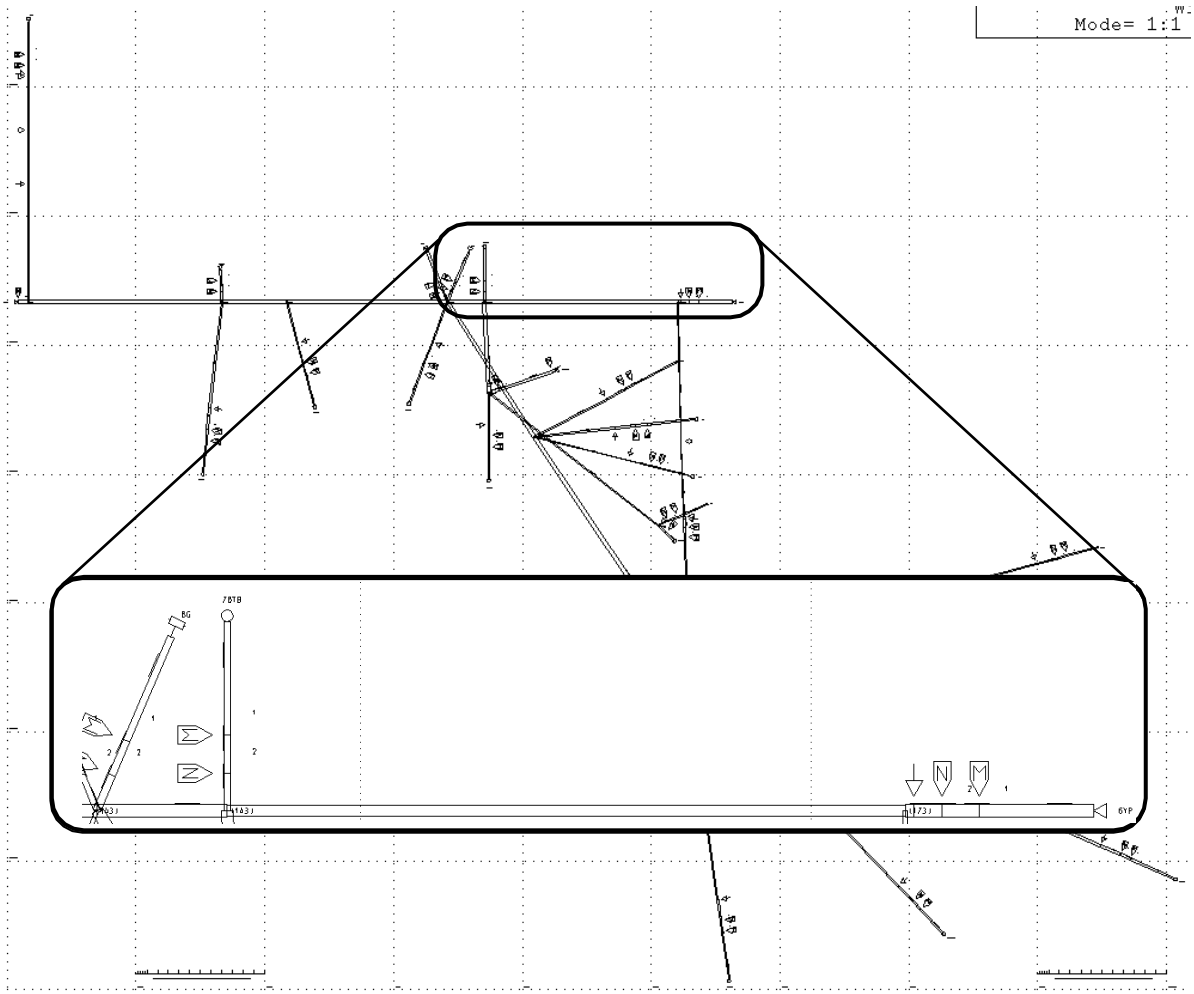
no	A sequential reference number for the wire (for this section of the report only).
FROM	The From connector defined for the wire.
TO	The To connector defined for the wire.
WIRE_NAME	The name/number of the wire
GA/TY	The gauge/type of wire.
S1, S2, S3	The twist or shield family to which the wire belongs.

see illustration on next page

------- L I S T O F W I R E S N O T C O N N E C T E D A T E I T H E R E N D ---------

no	FROM	TO	WIRE_NAME	GA/TY	S1	S2	S3
1	8G	6YP	F0000000014A	24 A A			
2			W0000000092A	24 A A			
3	6YP	109TB	F0000000190H	24 B A			
4			F0000000193B	24 B A			
5			F0000000193D	24 B A			
6			F0000000207C	24 B A			
7	2G	8G	G0000000002A	24 A A			
8	6YP	109YP	G0000000009E	24 A A			
9			G0000000010P	24 A A			
10			L0000000108G	18 A A			
11			L0000000118C	24 A A			
12			L0000000252C	24 A A			
13			L0000000264C	22 A A			
14			L0000000268C	24 A A			
15			W0000000154E	22 A A			
16			W0000000155C	24 A A			
17	7G	36TB	G0000000012A	24 A A			
18	36TB	6YP	G0000000012B	24 A A			
19			G0000000013A	24 A A			
20	7G	6YP	G0000000017B	24 A A			
21			L0000000069A	24 A A			
22			L0000000070C	24 A A			
23	78TB	6YP	H0000000212C	24 A B	002		
24	77TB	143H	H0000000212H	24 A C	004		
25			H0000000426A	24 A C	004		
26	82TB	6YP	H0000000213A	24 A B	002		
27	143H	81TB	H0000000400E	24 A C	004		
28	15TB	5M	M0000000001D	20 A A			
29			M0000000003D	18 A A			
30			M0000000026A	18 A A			
31	14TB	6YP	M0000000002C	20 A A			
32			M0000000004C	20 A A			
33	14TB	6M	M0000000002D	20 A A			
34			M0000000004D	18 A A			
35			M0000000027A	18 A A			
36	6YP	6M	M0000000006C	24 A A			
37			M0000000010C	18 A A			
38			M0000000013C	18 A A			
39	11M	5M	M0000000015A	18 A A			

Section 4: List of Wires Not Connected at Either End


Mode= 1:1
BG
7BTB
6YP

Section 5: Wires Link the Following Connector Pairs

This section of the Work Order file shows all the connector pairs that are linked (i.e., at least one wire is connected between them).

The following information is detailed for each wire link:

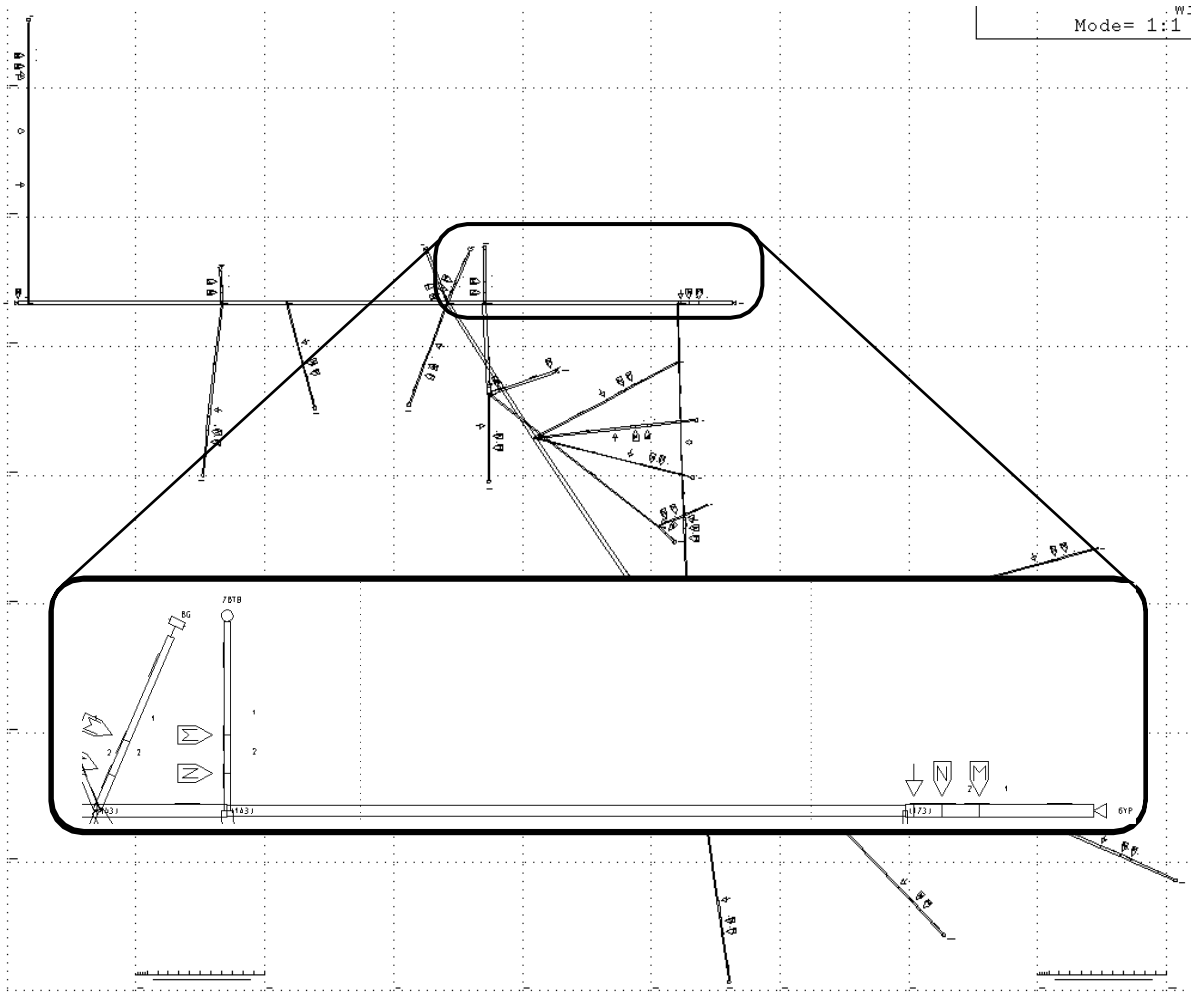
no	A sequential reference number for the wire link (for this section of the file only)
FROM	The starting connector
TO	The terminating connector
FROM_BRADY-TAPE_ COLOR	The braid color of the From connector
TO_BRADY-TAPE_ COLOR	The braid color of the To connector
FROM_COIL	The Coil number of the From connector.
TO_COIL	The Coil number of the To connector.
FROM_END_SOLDER	The status of the From connector (1st end or 2nd end).
TO_END_SOLDER	The status of the To connector (1st end or 2nd end).
NO_WIRES	The number of wires in the link
NO_CABLES	The number of cables in the link.

see illustration next page

----- WIRES LINK THE FOLLOWING CONNECTOR PAIRS --------
(for reference only)

no	FROM / TO	FROM_BRAID_COLOR / TO_BRAID_COLOR	FROM_COIL / TO_COIL	FROM_END_SOLDER / TO_END_SOLDER	NO_WIRES / NO_CABLES
1	10M	4WH	26	2nd.	1
	12M	2WH	25	1st.	1
2	61TB	2YL	15	2nd.	2
	5YP	10WH	1	1st.	2
3	109TB	3YL	16	2nd.	1
	5YP	10WH	1	1st.	1
4	5YP	10WH	1	1st.	3
	8G	12WH	4	2nd.	3
5	8G	12WH	4	2nd.	3
	3XYP	13WH	23	1st.	3
6	22F	7WH	10	1st.	2
	6YP	1WH	11	2nd.	1
7	23F	12YL	2	2nd.	2
	5YP	10WH	1	1st.	1
8	8G	12WH	4	2nd.	2
	6YP	1WH	11	2nd.	2
9	6YP	1WH	11	2nd.	4
	109TB	3YL	16	2nd.	4
	5M	3WH	12	2nd.	3
32	6YP	1WH	11	2nd.	3
	6M	1YL	19	2nd.	3
33	5YP	10WH	1	1st.	1
	13M	6YL	17	2nd.	1
34	11M	4YL	18	2nd.	1
	5M	3WH	12	2nd.	1
35	12M	2WH	25	1st.	1
	6M	1YL	19	2nd.	1
36	13M	6YL	17	2nd.	1
	3XYP	13WH	23	1st.	1

Section 5: Wires Link the Following Connector Pairs


Mode= 1:1
BG
7BTB
6YP

Chapter 3: Making Modifications

This chapter refers to a bundle that has been defined/created by the manufacturing procedures in Chapter 2, and details how to incorporate engineering changes, such as adding wires, to such a bundle.

This procedure can be broken down into seven stages, as follows:

Stage 1. Make the desired changes in the wiring diagram (e.g., add wires, exchange parts used, etc.).

Stage 2. Integrate the updated wiring diagram using the Wire Integration program. This updates the wires data base (Wires List) and parts data base (Parts List), as required in accordance with the changes made.

Stage 3. Release the new Wires List and/or Parts List (whichever was changed).

Stage 4. Update the definition of the BTP document by selecting the new issue of the Wires List or Parts List (whichever was changed).

Stage 5. Release the modified BTP document.

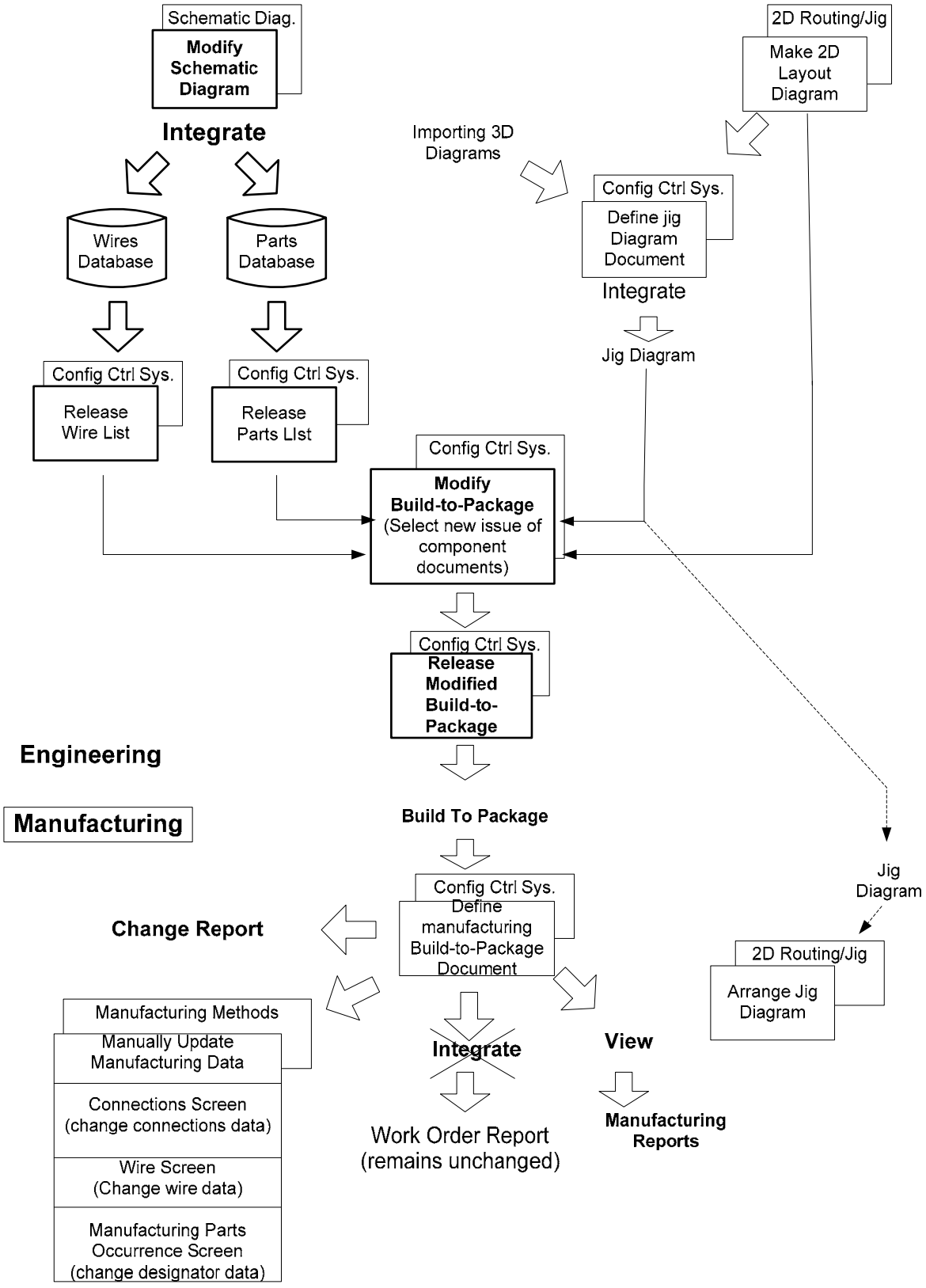
Stage 6. Update the definition of the MBTP document by selecting the new issue of the BTP document. To do this, select the document and then select Modify Document. When this is done, a special report detailing the differences between the new MBTP and the previous one is automatically produced.

Stage 7. Using the **View** MBTP option, produce updated manufacturing reports.

After performing these operations, you have a report detailing the changes (generated when the MBTP document was updated - Stage 6 above) and updated manufacturing reports. The Work Order file, however, has not been changed. This allows you to continue using the previous Work Order report and incorporate the changes as you see fit.

If desired, you can also **integrate** the updated MBTP document to produce an entirely new Work Order file which includes the changes made.

The following figure illustrates this process as an overlay over the engineering and manufacturing operations discussed earlier. The operations to be performed to incorporate an engineering design change are printed in **bold**.



Incorporating Engineering Changes into the Manufacturing Data Base

Chapter 4: Manual Changes for Manufacturing

This chapter explains how to manually change manufacturing data, including

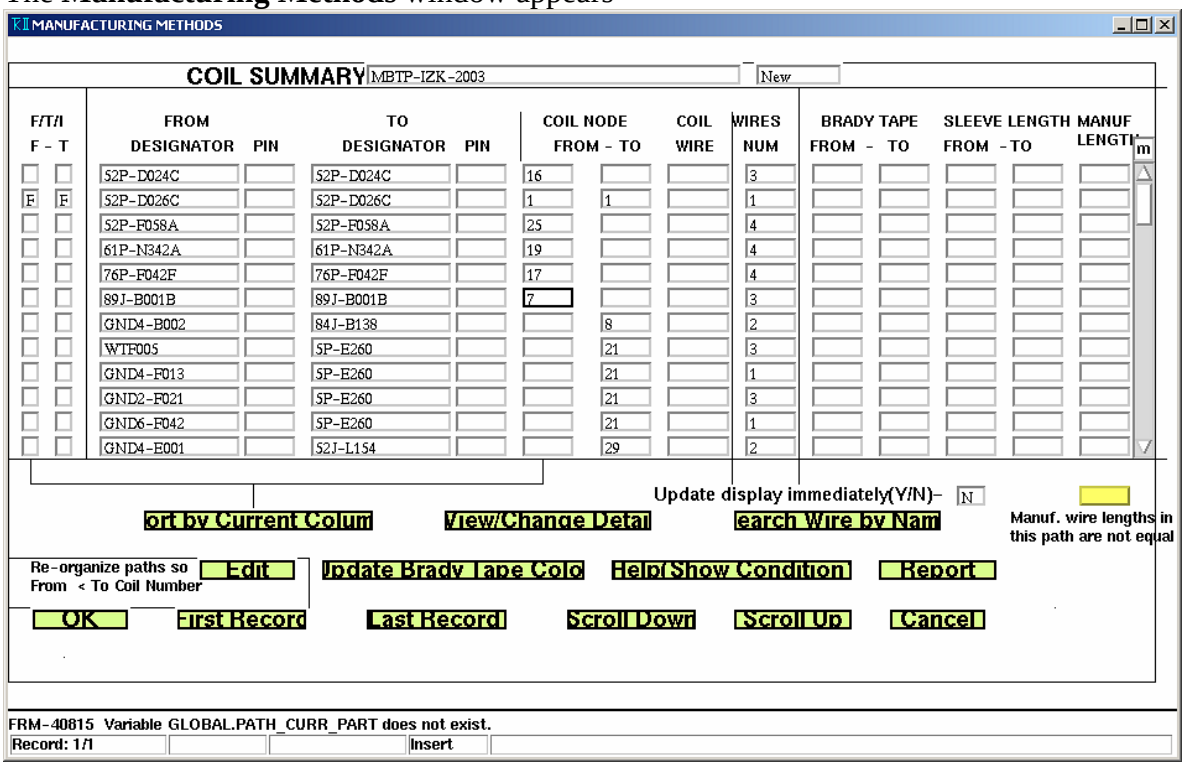
- changes in connections (for example Coil No, Brady Tape)
- changes in wires (e.g., Ferrule Length, Sleeve Code, Wire Length)
- changes in designators (e.g., Tetra Etch, Brady Tape, First Terminator).

These changes are made using a number of screens; the screen displayed determines the type of changes you can make.

Further details on the screens and step-by-step instructions are given in the following Operating Instructions section.

1. Select **Modify…** from working space

The **Manufacturing Methods** window appears

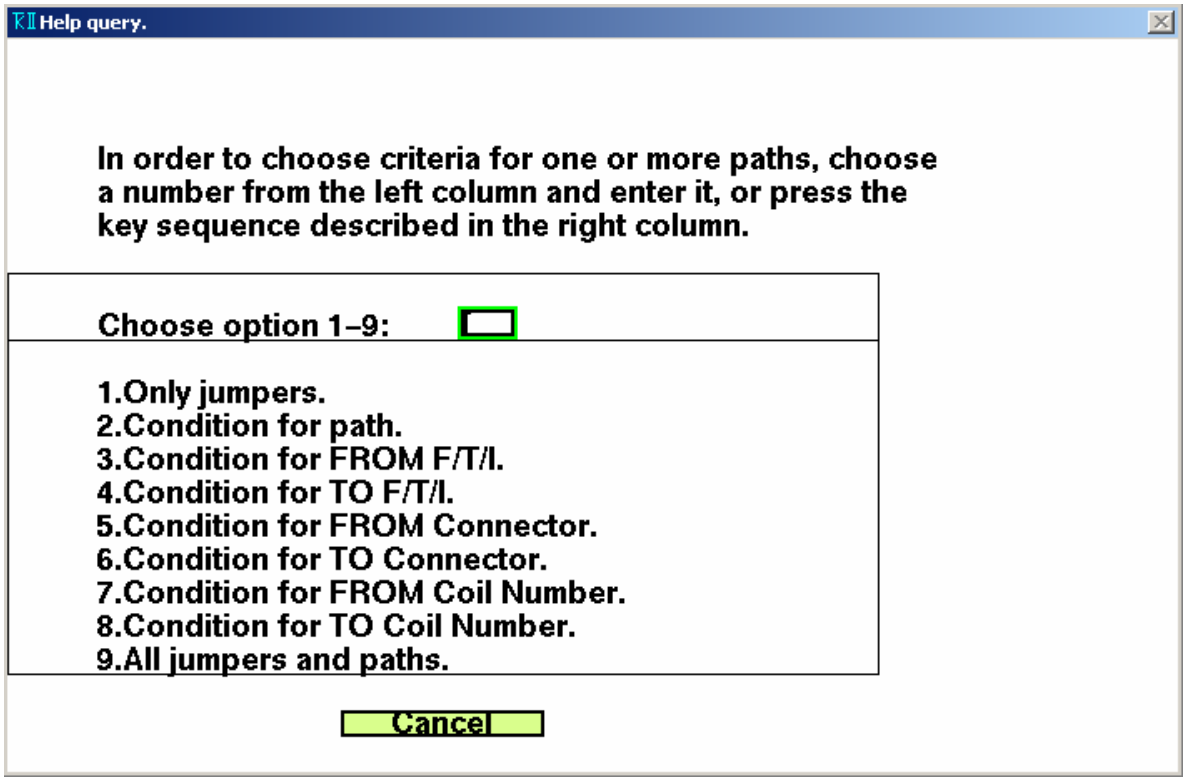


Setting Path Conditions

At this point you can easily specify those items you are interested in. In effect this function defines filters for you to view and change manufacturing data.

2 To define criteria for the items to be displayed in the Manufacturing Methods window, press the **Help/Show Condition** button on the Manufacturing Methods window.

The Help Query window is then displayed.


Help query.
In order to choose criteria for one or more paths, choose a number from the left column and enter it, or press the key sequence described in the right column.
Choose option 1–9:
1.Only jumpers.
2.Condition for path.
3.Condition for FROM F/T/I.
4.Condition for TO F/T/I.
5.Condition for FROM Connector.
6.Condition for TO Connector.
7.Condition for FROM Coil Number.
8.Condition for TO Coil Number.
9.All jumpers and paths.
Cancel

The Help Query Window

3 To select an option, enter its number and press **Enter**. The nine options are now described.

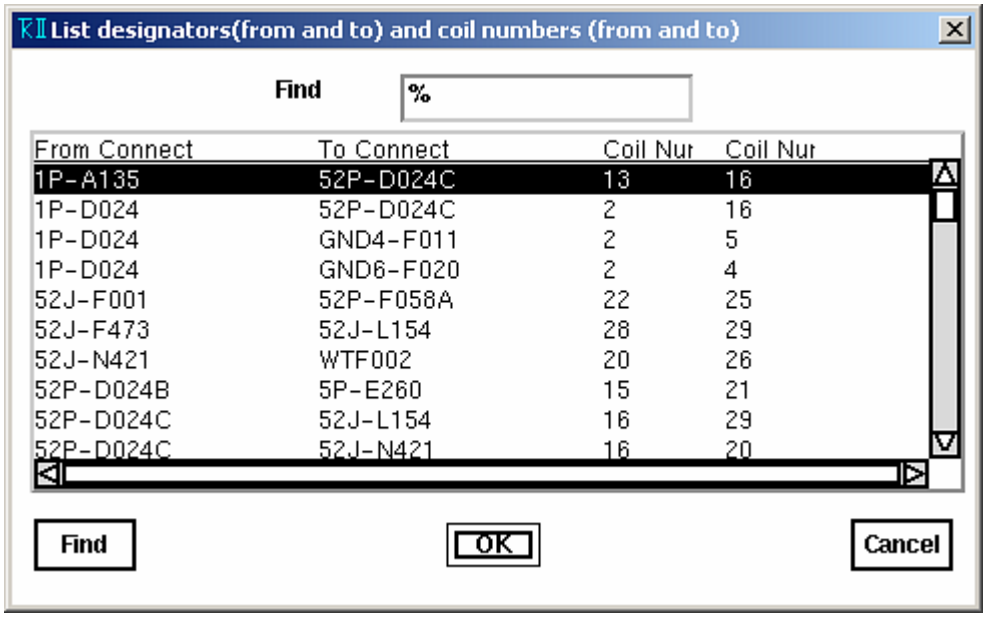
.

To Display Only Jumpers:

3.1 Enter **1** from the Help Query window. Only the jumpers are displayed.

To Set Path Conditions:

3.2 Enter **2** from the Help Query window. The list designators window with the paths in the document is displayed.

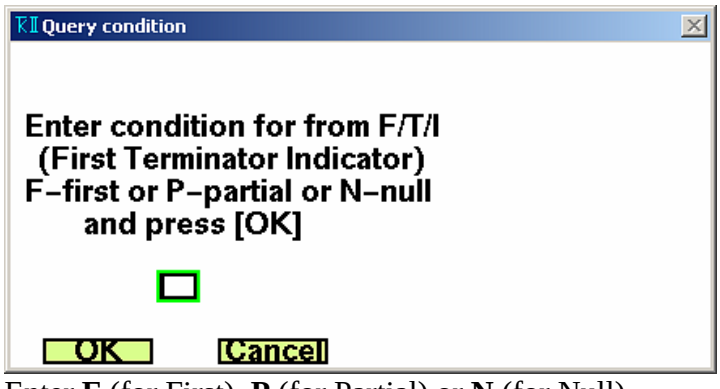


Selecting Path Conditions

Select the desired path and press **OK**.

To Set From F/T/I Conditions:

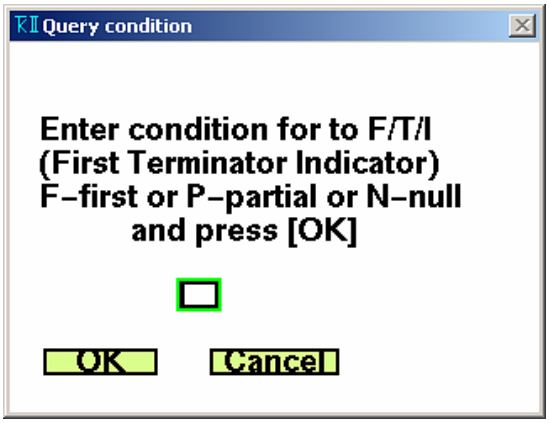
3.3 Enter **3** from the Help Query window. A condition window is displayed



Enter **F** (for First), **P** (for Partial) or **N** (for Null)
Press **OK**

To Set To F/T/I Conditions:

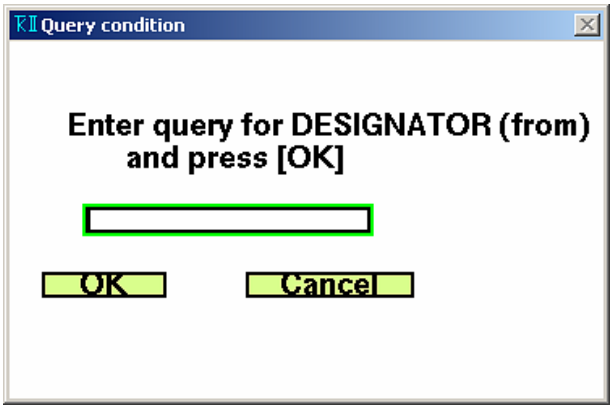
3.4 Enter **4** from the Help Query window. A condition window is displayed.



Enter **F** (for First), **P** (for Partial) or **N** (for Null)
Press **OK**

To Set From Connector Conditions:

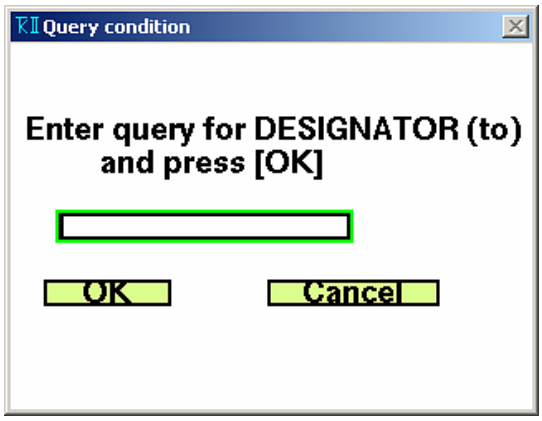
3.5 Enter **5** from the Help Query window. A condition window is displayed.



Enter the desired To Designator.
Press **OK.**

To Set To Connector Conditions:

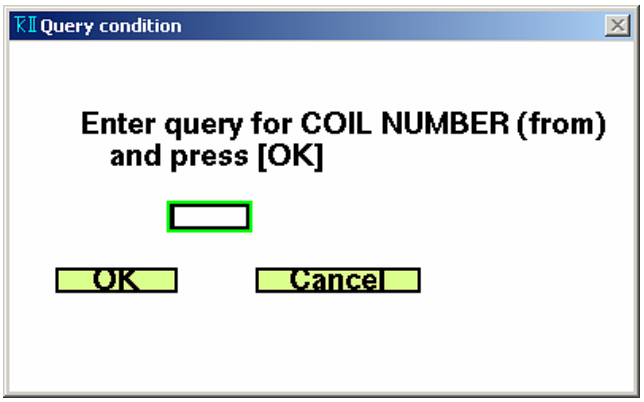
3.6 Enter **6** from the Help Query window. A condition window is displayed.



Enter the desired From Designator.
Press **OK**.

To Set From Coil Number Conditions:

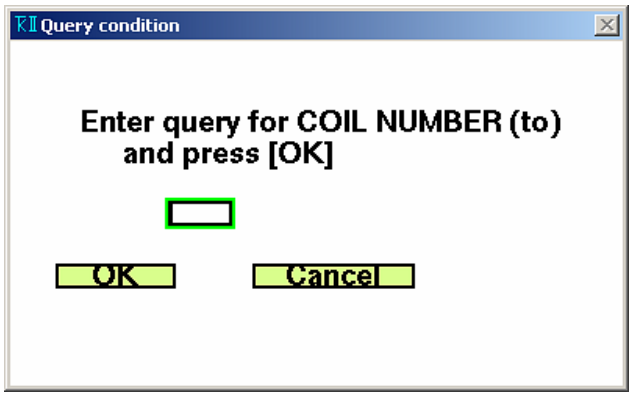
3.7 Enter **7** from the Help Query window. A condition window is displayed



Enter the desired From Coil Number.
Press **OK.**

To Set To Coil Number Conditions:

3.8 Enter **8** from the Help Query window. A condition window is displayed.

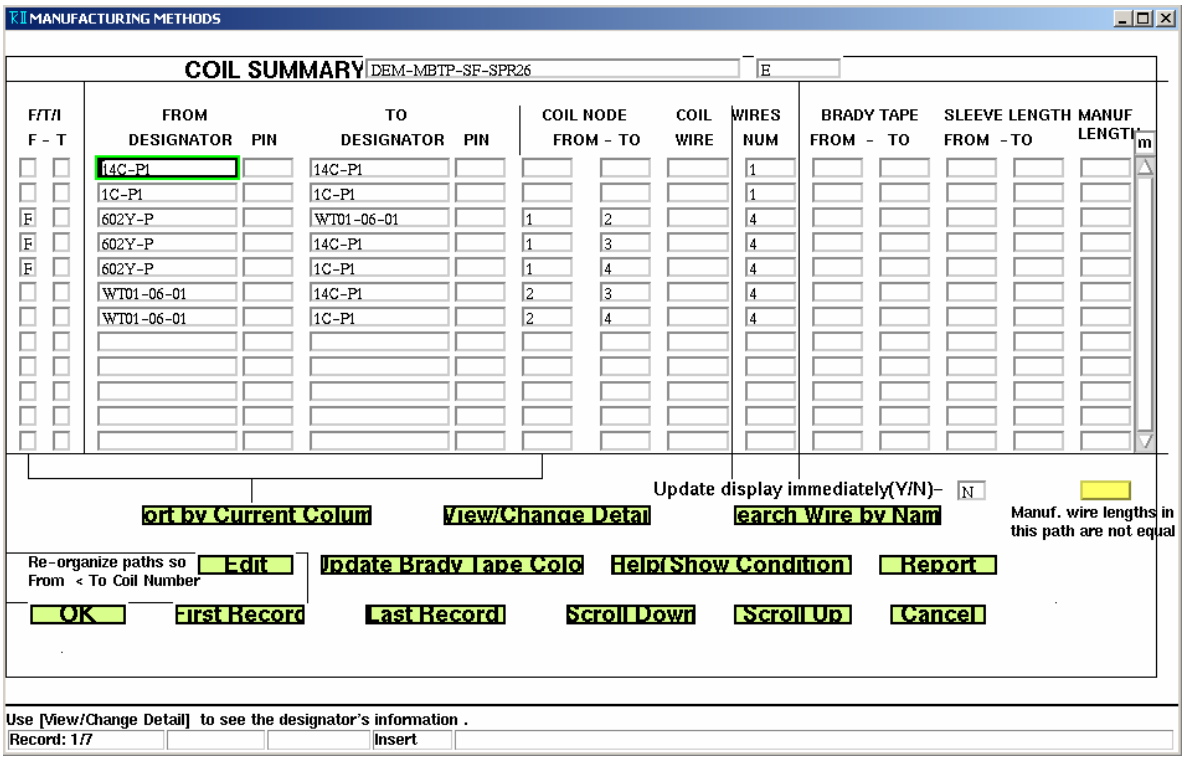


Enter the desired To Coil Number.
Press **OK**.

To Display All Jumpers and Paths:

3.9 Enter **9** from the Help Query window. All jumpers and all paths are displayed.

The Manufacturing Methods Window



The Manufacturing Methods Window

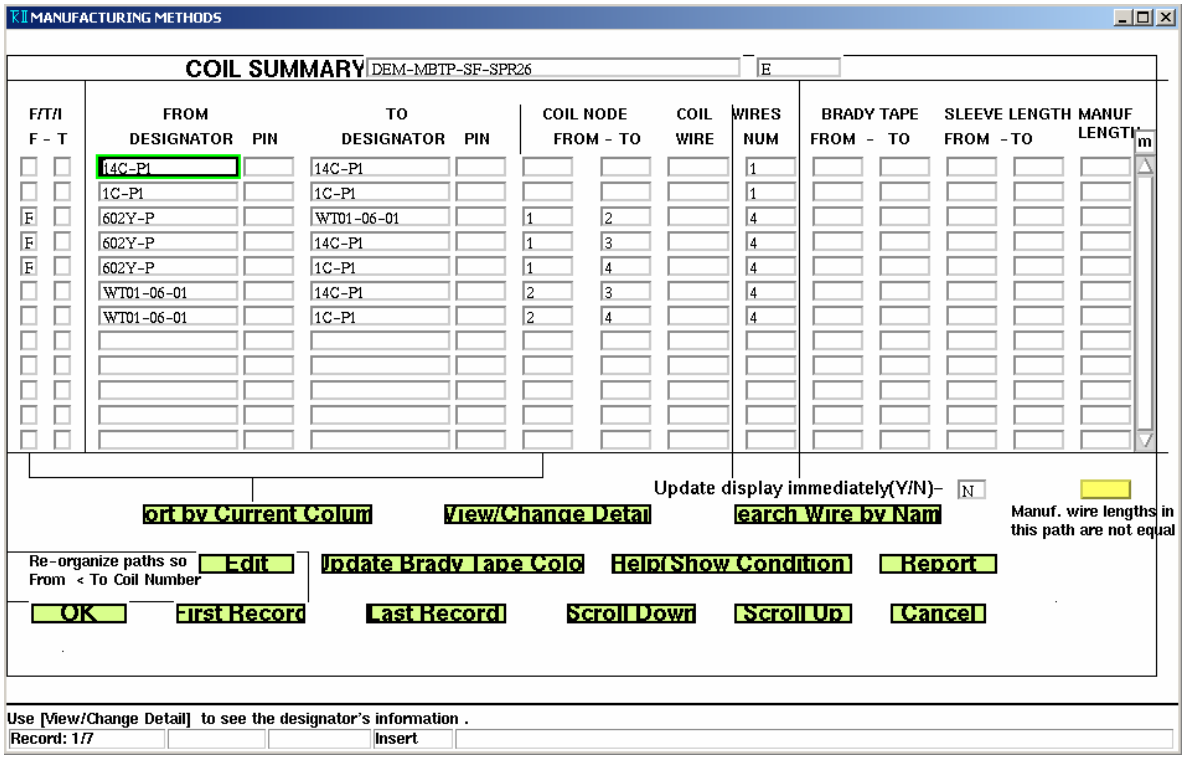
The Manufacturing Methods window is sorted as follows: first the jumpers are listed and then the remaining paths are listed according to Coil No. The Manufacturing Methods window presents the following information for each connection in the bundle, shaded fields may be changed:

F/T/I	First Terminator Indication: F for a first end terminator, P for a Partial end terminator, or blank. This field may be changed.
DESIGNATOR	The **From** and **To** designators. Read only.
COIL NO.	The coil numbers of the From and To designators. This field may be changed. Refer to the description of the COIL MODE field, above.
NUMBER OF WIRES	The number of wires between the two designators. Although this field is read only, you can advance to the Wires window from this field. See explanation below.
BRADY TAPE	The color and number of the Brady tapes of the From and To designators. These fields may be changed.
SLEEVE LEN.	The sleeve length of the From and To designators. This field may be changed. However, sleeve lengths can be entered only for single wires.

Making Changes

Changing Paths Data

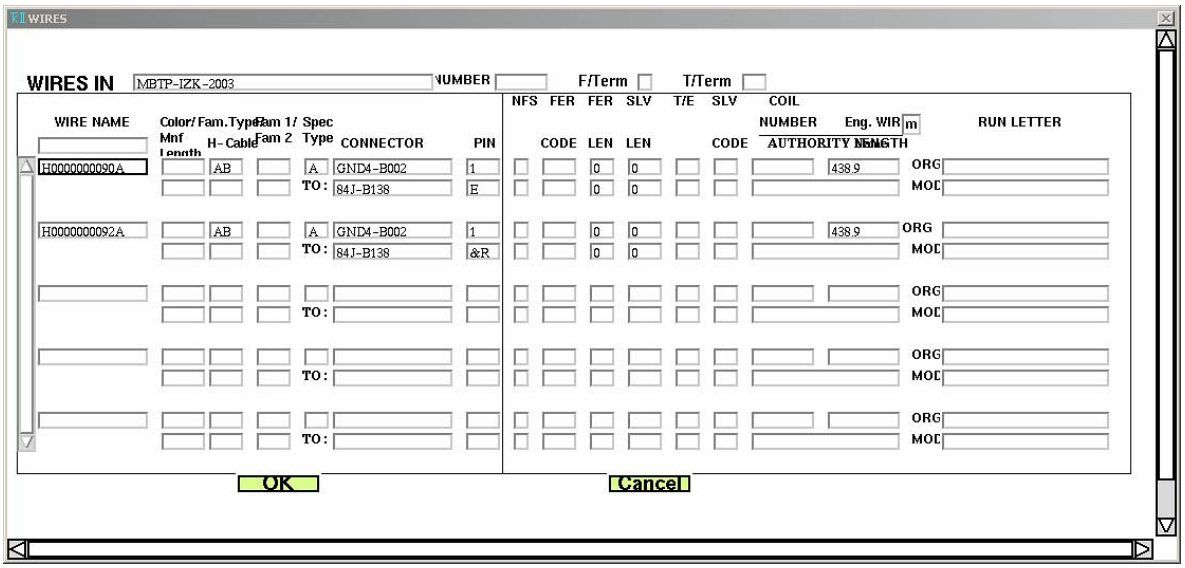
As explained above, the **Manufacturing Methods** window allows you to change the following fields: **F/T/I, COIL NO., BRADY TAPE,** and **SLEEVE LEN.**



4. Edit these fields as desired. Navigate using **<First Record>, <Last Record>, <Scroll Down>, <Scroll Up>** buttons. Use <**MB1**> or press **Tab** to advance to the next field and **Shift-Tab** to return to the previous field.
5. To save your changes, Press **OK**.
   You receive a confirmation that the window was updated with the number of fields changed.
   Close the screen by selecting **Cancel.**
   To split a paths line (i.e., to move some of the wires in the path to a new coil) see **Changing Wires Data** below.

Changing Wires Data

6. Place the cursor in the **WIRES NUMBER** field on the line of the connection with the wire(s) you want to change and select **View/Change details** button. The **Wires** window appears.



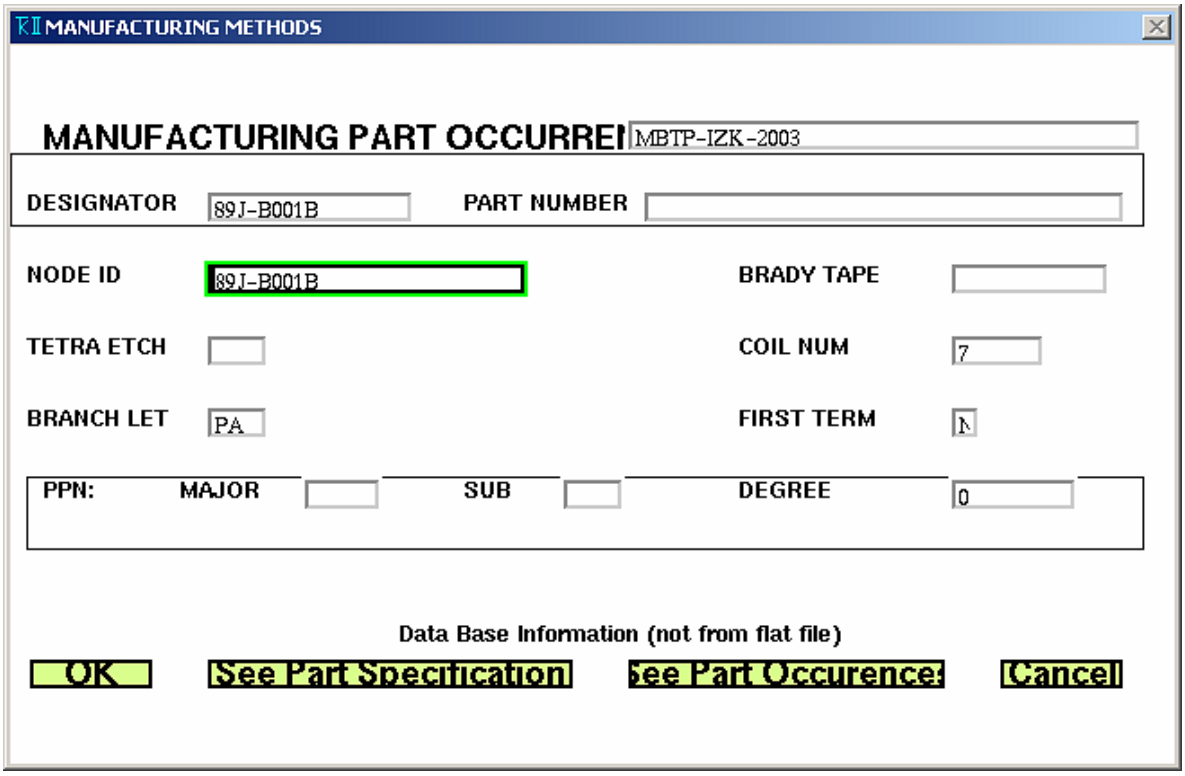
On the top line, the Wires window displays general information (read-only) about the MBTP document and selected connection. The rest of the window details the wires that are in the selected connection. The Wires window allows you to change the following wire-related fields:

NFS	Not First Solder - N for a first solder, otherwise blank (for From and To Connector)
FER CODE	The ferrule code of the wire.
FER LEN	The ferrule length of the wire.
SLV LEN	The sleeve length of the wire.
T/E	The Tetra Etch of the wire (for From and To Connector).
SLV CODE	The Sleeve Code (for From and To Connector).
COIL	The Coil number.
WIRE LENGTH	The length of the wire

7. Update the fields as desired
8. To save your changes, **press OK.**
   You receive a confirmation that the records were updated.
   To close the screen, **press Cancel.** You return to the **Manufacturing Methods** window.
   Sometimes, it is necessary to transfer a wire or wires from one coil (e.g., Coil No 6) to another coil (e.g., Coil No 6A). To do this, enter the new coil number in the COIL field of the wire(s) and Commit (**OK**) your changes. The Methods screen will automatically be updated and split into two groups: the wires which are still defined for the original coil (Coil No 6) and those defined for the new coil (Coil No 6A). This procedure can be used to handle backtwists.

Changing Designator and Coil No. Data

9. From the **DESIGNATOR** or **COIL NO.** field, select **View/Change Details.** The **Manufacturing Methods** - Manufacturing Part Occurrence window for the selected designator is displayed.



Manufacturing Part Occurrence Window

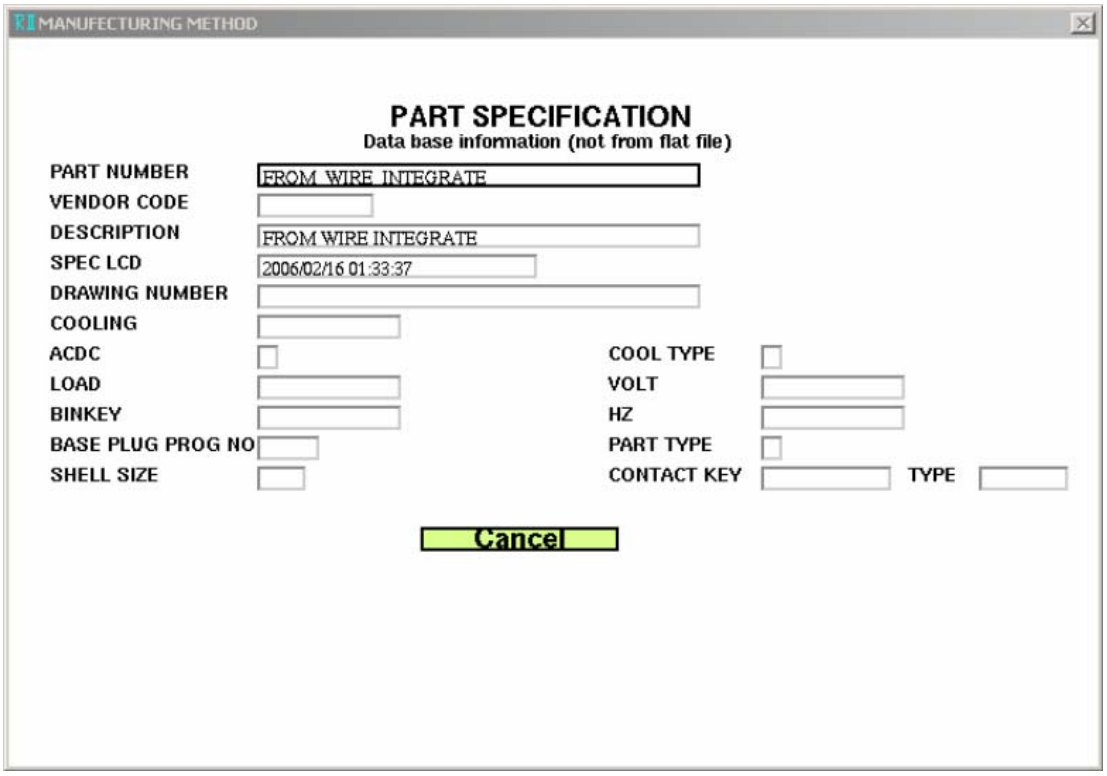
The Manufacturing Part Occurrence window allows you to update the following fields:

BRADY TAPE	The Brady tape color defined for the designator.
TETRA ETCH	The Tetra Etch of the designator
COIL NO	The Coil No of the designator.
BRANCH LET	The branch letter of the connector, indicating the area of the jig that it is to be placed in (as determined in the Jig).
FIRST TERM	First Terminator - if the designator is a first terminator F is entered here; otherwise, this field is left blank.
PPN	The key of the soldering sequence for inserting the wires into the pins of the connector.

After you have updated this window, press **OK** to return to the Manufacturing Methods window. If you have no changes, press **Cancel**. .

You can retrieve, for reference only, the Part Specifications Window (step 10) and Engineering Part Occurrence Window (step 11) of the designator.

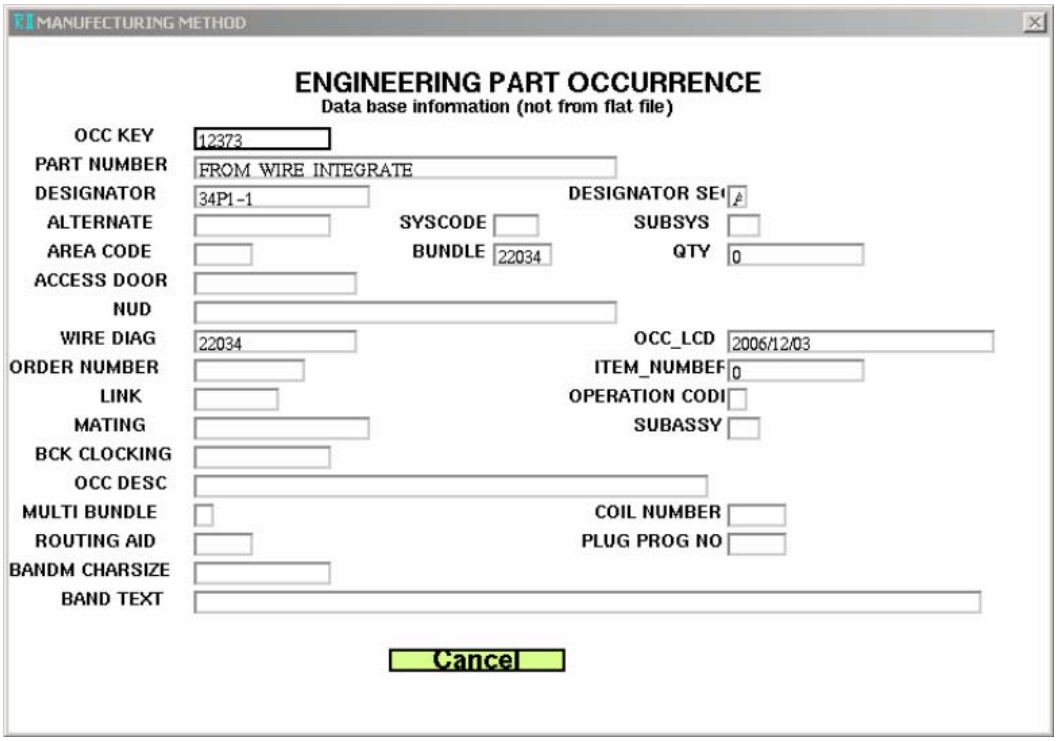
10. Press **See Part Specification** button.
The **Part Specificatio**n window is displayed.



The Part Specification Window (Read-Only)

Press **Cancel** to return.

11. Press **See Part Occurrence** button.
The **Engineering Part Occurrence** window is displayed.



The Engineering Part Occurrence Window (Read-Only)

Press **Cancel** to return.

Chapter 5: MBTP Reports

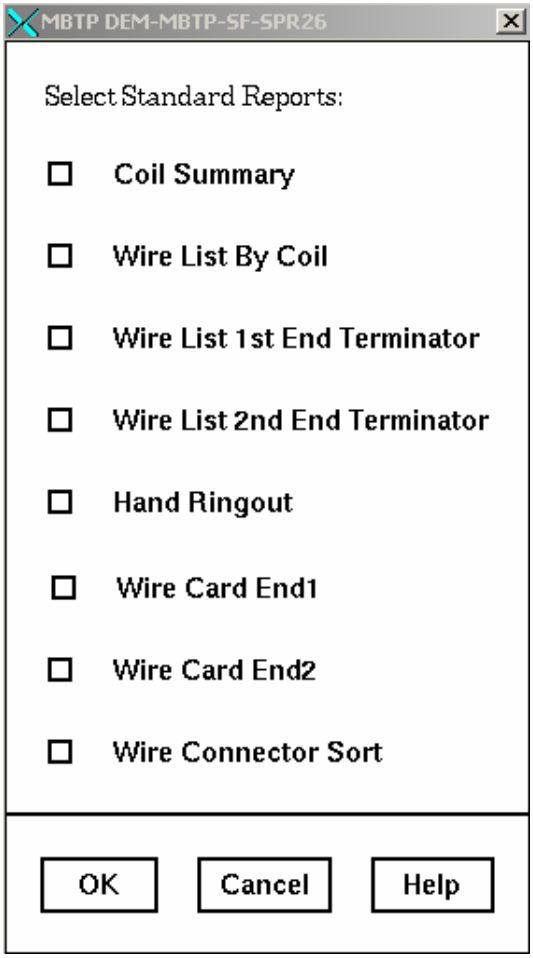
HarnesSYS enables you to generate a variety of manufacturing reports which describe the contents, assembly and testing of bundles. The following types of reports are available:

Coil Summary	Lists the coils.
Wire List by Coil	Lists the wires in each coil.
Wire List 1st End Terminator	Describes each first end connector and the wires connected to it.
Wire List 2nd End Terminator	Describes each second end connector and the wires connected to it.
Hand Ringout	Describes the points used to check continuity of the bundle.

This section describes how to create these reports and explains their contents.

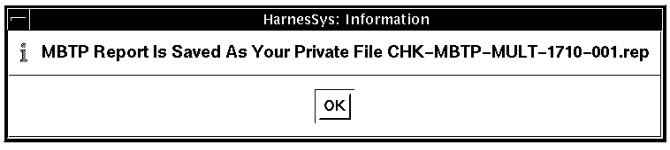
Creating MBTP Reports

1. From the Working Space, select the MBTP using **<MB1>** and press the **View** button.
   A list of standard report types is displayed.



2. Select your required reports and press **OK**.

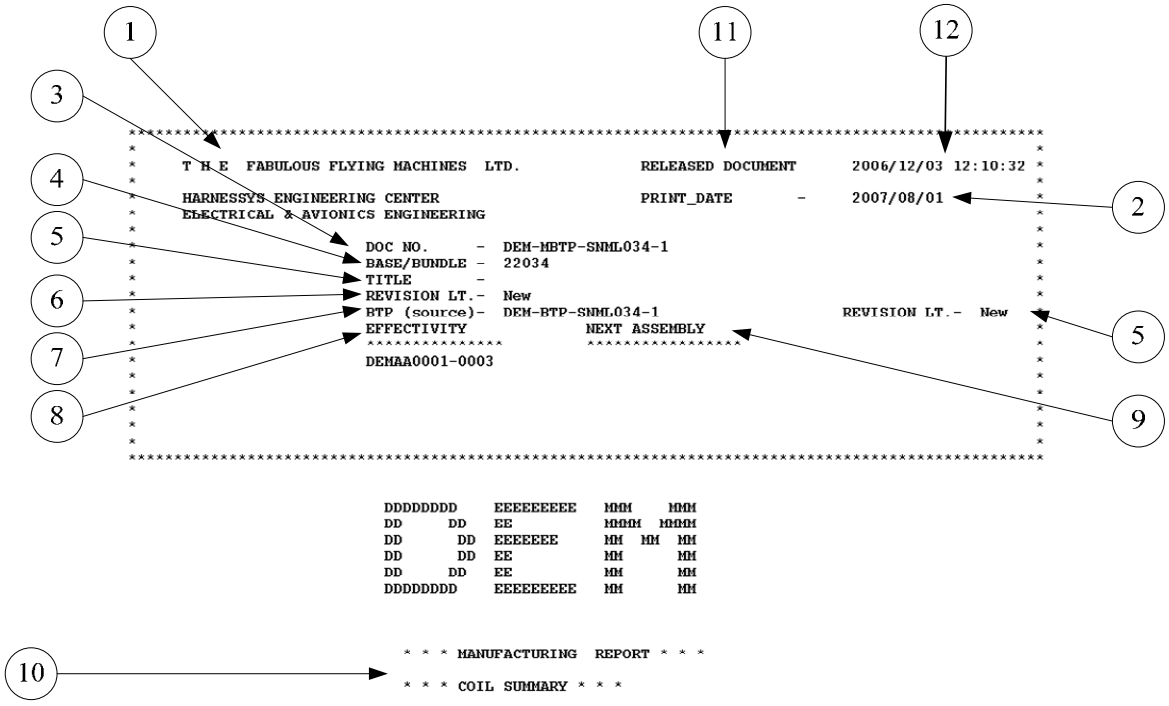
   The selected reports are generated and a message window confirming the process and displaying the name of the report file appears (see example below).



3. Press **OK** to close the message window.

Banner Page

Each report is prefaced by a banner page which presents general information about the bundle, the MBTP document and the report itself (see example below).



A Manufacturing Report Banner Page

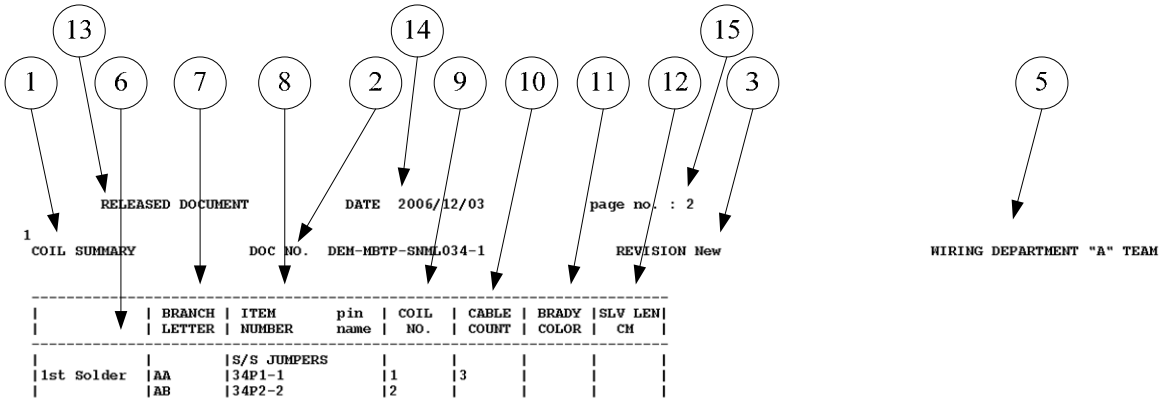
Each banner page presents the following information:

Filed Number	Field	Description
1.	COMPANY DATA	General banner information (from Project Defaults).
2.	PRINT_DATE	The date of printing.
3.	DOC NO	The document number of the selected MBTP document
4.	BASE/BUNDLE	The Base or Bundle number of the BTP
5.	LIST TITLE	The title of the document (from the document's definition).
6.	REVISION	The revision of the selected MBTP document.
7.	BTP (source)	The document number and revision letter of the BTP document that the selected MBTP

		document is based on.
8.	EFFECTIVITY	The effectivities defined for the MBTP document.
9.	NEXT ASSEMBLY	The Next Assembly defined for the selected MBTP document.
10.	Report Type	The type of manufacturing report (e.g., Coil Summary, Wire List by Coil).
11.	Status	The status of the selected MBTP document.
12.	Date and Time	The date and time of produced.

Coil Summary

The **Coil Summary** report lists the coils used for the bundle. First, the jumpers are listed and then each coil appears sorted according to Coil No. (i.e., twist sequence). Each line of the report presents general information about a different coil (see example below).



A Coil Summary Report Page

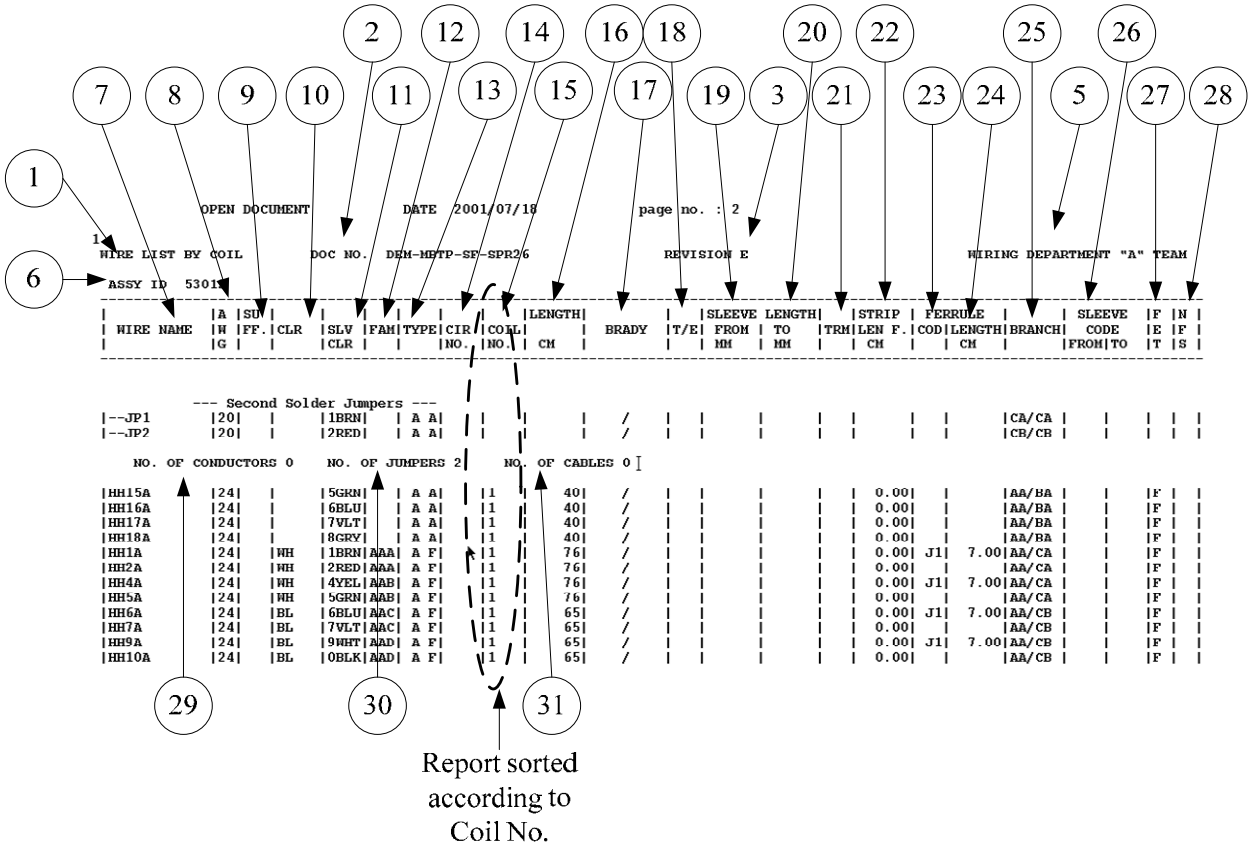
A Coil Summary report presents the following information:

Filed Number	Field	Description
1.	Coil Summary	The type of manufacturing report.
2.	DOC NO.	The document number of the selected MBTP document.
3.	REV	The revision letter of the selected MBTP document.
5.	WIRING DEPARTMENT	Details describing the department to which the MBTP is assigned (from Project Defaults).
6.	Termination Indicator	If the part described in the line is a 1st end terminator, "1st Solder" appears. If it is a Partial connector, "Partial" appears. Otherwise (i.e., if it is a 2nd end terminator), this field is blank.
7.	BRANCH LETTER	The Branch Letter of the part. This indicates the area of the jig where the part should be placed.
8.	ITEM NUMBER	The part number of the part.
9.	COIL NO.	The coil number for the part.
10.	CABLE COUNT	The number of cables connected to the part. A Cable is

		defined as a lone wire or a distinct group of wires (e.g., twisted/shielded together).
11.	BRADY COLOR	The color of the Brady tape defined for the coil.
12.	SLV LEN INCH	The length of protective sleeving (for wires not defined as hook-up wires). Whether a wire is a hook-up wire or not is determined via the Wire Specifications program.
13.	Status	The status of the selected MBTP document.
14.	Date	The date the report was produced.
15.	Footer	The footer defined for reports (via Project Defaults). In the example above, the footer was defined as "page no.-".

Wire List by Coil

The Wire List by Coil report describes each wire in the bundle. This report is broken down and sorted according to Coil No (see example below).


OPEN DOCUMENT DATE 2001/07/18 page no. : 2
WIRE LIST BY COIL DOC NO. DEM-MBTP-SF-SPR26 REVISION E WIRING DEPARTMENT "A" TEAM
ASSY ID 5301
WIRE NAME
--- Second Solder Jumpers ---
NO. OF CONDUCTORS 0 NO. OF JUMPERS 2 NO. OF CABLES 0
Report sorted according to Coil No.

A Wire List by Coil Report Page

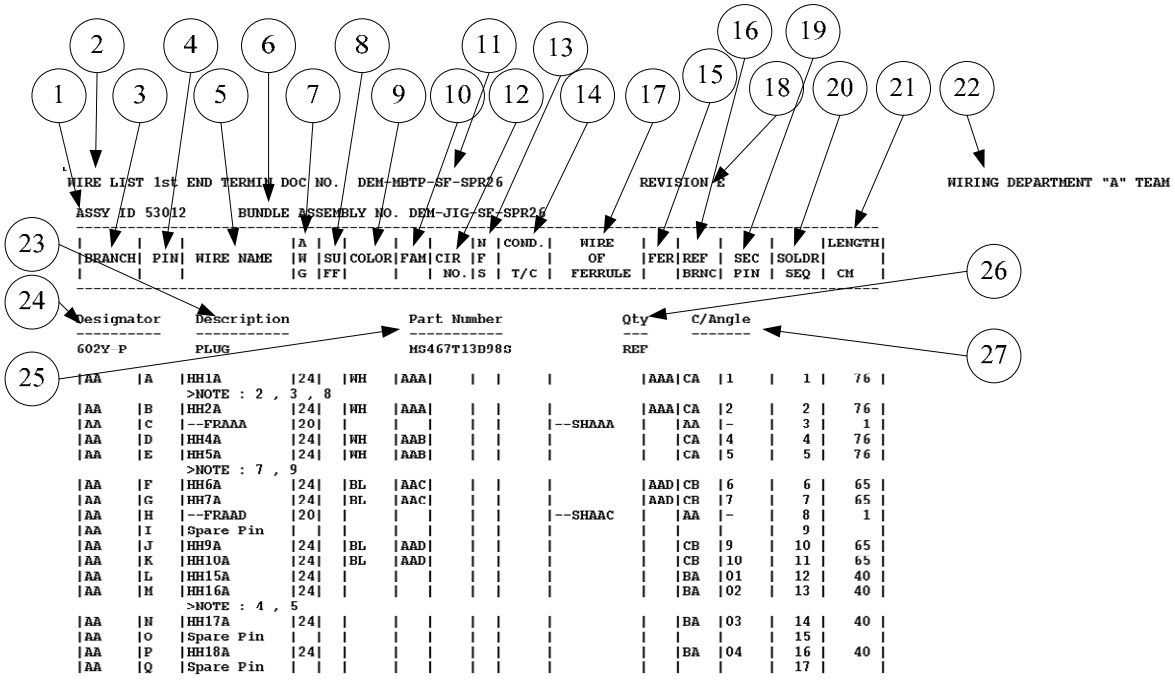
Each data page of a Wire List by Coil report contains the following information:

Filed Number	Field	Description
1.	Wire List by Coil	The type of manufacturing report.
2.	DOC NO	The document number of the selected MBTP document
3.	REV	The revision letter of the selected MBTP document
5.	WIRING DEPARTMENT	Details describing the department to which the MBTP is assigned (Project Defaults).
6.	ASSY ID	The base number of the bundle.
7.	WIRE NAME	The wire name field.
8.	AWG	The American Wire Gauge (cross-section) of the wire
9.	SUFF	The Suffix of the wire (e.g., N for Ground, AL for Alumel)
10.	CLR	The Color field.
11.	SLV CLR	The sleeve color (defined by the last character in the wire name).
12.	FAM	The name of the shield the wire is in (deter- mined by the Integrate Wires program).
13.	TYPE	The Type field of the wire. Composed of Fam- ily Type and Spec Type. See the Integrate User Guide for details.
14.	CIR NO	The type of wire according to specific work environment (derived from the Wire Specifications library).
16.	LENGTH	The total cut length of the wire being the point to point length plus the length added for Brady tape and twisting (in the units determined in Project Defaults).
17.	BRADY	The color of the Brady tape defined for the coil.
18.	T/E	The Tetra Etch defined for the wire (insulation etching for potting). Can be manually changed for the wire via the Wires screen (see Manual Changes for Manufacturing earlier in this manual).
19.	SLEEVE FROM	The length of protective sleeving for the From end of the wire (for non hook-up wires). Manually entered via the Wires screen (see Manual Changes for Manufacturing earlier in this manual).
20.	SLEEVE TO	The length of protective sleeving for the From end of the wire (for non hook-up wires). Manually entered via the Wires screen (see Manual Changes for Manufacturing earlier in this manual).
21.	TRM	The From and To Termination Code field (Bin code or Lug).
22.	STRIP LEN F	The bincode's Strip Length.
23.	FERRULE COD	The 2 character code describing the ferrule for the wire. Manually entered via the Wires screen (see Manual Changes for Manufacturing earlier in this manual).
24.	FERRULE LENGTH	The ferrule length (in inches or millimeters as defined in Project Defaults) for the wire. This is the length from the end of the wire to the start of the ferrule. Manually entered via the Wires screen (see Manual Changes for Manufacturing earlier in this manual).
25.	BRANCH	The Branch Letter of the part. This indicates the area of the jig

		where the part should be placed.
26.	SLEEVE CODE	The sleeve code for the wire. Manually entered via the Paths screen (see Manual Changes for Manufacturing earlier in this manual).
27.	FET	First End Terminator - F appears for a first end terminator and P for partial; otherwise, this field is blank.
28.	NFS	Not First Solder - N appears for a first solder; otherwise, this field is blank.
Before the wires in each bundle are described (using the fields explained above) the following information describing the coil is given		
29.	NO. OF CONDUCTORS	The number of conductors, or individual wires, belonging to the coil.
30.	NO. OF JUMPERS	The number of jumpers belonging to the coil.
31.	NO. OF CABLES	The number of cables (i.e., lone wires or distinct groups of wires) belonging to the coil

Wire List 1st End Terminator

The Wire List 1st End Terminator report describes each first end connector and the wires connected to it.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
WIRE LIST 1st END TERMIN DOC NO. DEM-MBTP-SF-SPR26 REVISION E WIRING DEPARTMENT "A" TEAM
ASSY ID 53012 BUNDLE ASSEMBLY NO. DEM-JIG-SF-SPR26
BRANCH PIN WIRE NAME AWG SU FF COLOR FAM CIR NO. F S COND. T/C WIRE OF FERRULE FER BRNC REF PIN SEC SEQ SOLDR CM LENGTH
Designator Description Part Number Qty C/Angle
602Y-P PLUG MS467T13D98S REF
AA A HH1A 24 WH AAA CA 1 1 76
>NOTE : 2 , 3 , 8
AA B HH2A 24 WH AAA CA 2 2 76
AA C --FRAAA 20 AA - 3 1 SHAAA
AA D HH4A 24 WH AAB CA 4 4 76
AA E HH5A 24 WH AAB CA 5 5 76
>NOTE : 7 , 9
AA F HH6A 24 BL AAC CB 6 6 65
AA G HH7A 24 BL AAC CB 7 7 65
AA H --FRAAD 20 AA - 8 1 SHAAC
AA I Spare Pin CB 9
AA J HH9A 24 BL AAD CB 9 10 65
AA K HH10A 24 BL AAD CB 10 11 65
AA L HH15A 24 BA 01 12 40
AA M HH16A 24 BA 02 13 40
>NOTE : 4 , 5
AA N HH17A 24 BA 03 14 40
AA O Spare Pin 15
AA P HH18A 24 BA 04 16 40
AA Q Spare Pin 17

A Wire List 1st End Terminator Report Page

Each data page of a Wire List 1st End Terminator report contains the following information:

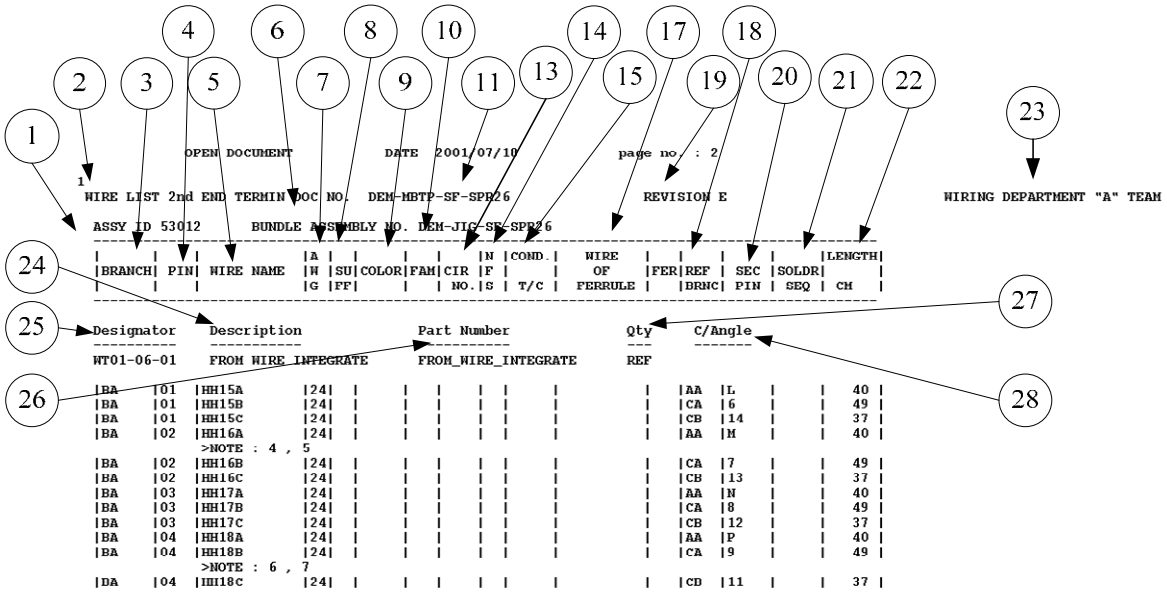
Filed Number	Field	Description
1.	ASSY ID	The base number of the bundle.
2.	Report Type	Wire List 1st end terminator report.
3.	BRANCH	The Branch Letter of the part. This indicates the area of the jig where the part should be placed.
4.	PIN	The number of the pin the wire is connected to.
5.	WIRE NAME	The wire name.
6.	BUNDLE ASSEMBLY NO.	The document number of the jig diagram in the MBTP
7.	AWG	The American Wire Gauge (cross-section) of the wire.
8.	SUFF	The Suffix of the wire (e.g., N for Ground, AL for Alumel)
9.	CLR	The color of the wire's insulation (as entered in the wiring diagram). If no color was entered in the wiring diagram and the wire is twisted, TW appears.
10.	FAM	The name of the shield the wire is in
11.	DOC NO	The document number of the selected MBTP document.
12.	CIR NO	The type of wire according to specific work environment.
13.	NFS	Not First Solder - N appears for a first solder, otherwise this field is blank
14.	COND. T/C	The Conductor (wire) Terminating Code.
15.	FER	The ferrule family of the From connector.
16.	REF BRNC	The branch letter of the other side of the wire.
17.	WIRE OF FERRULE	Ferrule wire name.
18.	REV	The revision of the selected MBTP document.
19.	SEC PIN	The pin of the TO connector.
20.	SOLDER SEQ	The soldering sequence of the wire.
21.	LENGTH	The total cut length of the wire being the point to point length plus the length added for Brady tape and twisting (in the units determined in Project Defaults).
22.	WIRING DEPARTMENT	Details describing the department to which the MBTP is assigned

The report is divided according to 1st end connectors. Note that each section has a list of the parts in it. The main part is displayed first followed by the secondary parts. Each part is described by the following fields.

23.	Description	The description of the connector (from Parts Specifications).
24.	Designator	The designator of the connector.
25.	Part Number	The part number of the connector
26.	Qty	The quantity of the part described (according to designator) that is used in the assembly.
27.	C/Angle	The clocking angle of the connector (from Parts Specifications).

Wire List 2nd End Terminator

The Wire List 2nd End Terminator report describes each second end connector and the wires connected to it.



Wire List 2nd End Terminator Report Page

Each data page of a Wire List 2nd Terminator report contains the following information:

Filed Number	Field	Description
1.	ASSY ID	The base number of the bundle.
2.	Report Type	Wire List 2nd end Terminator report.
3.	BRANCH	The Branch Letter of the part.
4.	PIN	The number of the pin the wire is connected to.
5.	WIRE NAME	The wire name.
6.	BUNDLE ASSEMBLY NO.	The document number of the jig diagram in the MBTP.
7.	AWG	The American Wire Gauge (cross-section) of the wire.
8.	SUFF	The Suffix of the wire (e.g., N for Ground, AL for Alumel).
9.	CLR	The color of the insulation used on the wire. If the wire is twisted and no color was entered, "TW" may appear
10.	FAM	The name of the shield the wire is in.
11.	DOC NO	The document number of the selected MBTP document.
13.	CIR NO	The type of wire according to specific work environment.
14.	NFS	Not First Solder - N appears for a first solder, otherwise this field is blank.
15.	COND. T/C	The Conductor (wire) Terminating Code.
17.	WIRE OF FERRULE	Ferrule wire name.
18.	REF BRNC	The branch letter of the other side of the wire.
19.	REV/VER	The revision and version (not yet in use) of the selected MBTP document.
20.	SEC PIN	The pin of the To connector.
21.	SOLDER SEQ	The soldering sequence of the wire.
22.	LENGTH	The length of the wire
23.	WIRING DEPARTMENT	Details describing the department to which the MBTP is assigned.

The report is divided according to 2nd end connectors. Note that each section has a list of the parts in it. The main part is displayed first followed by the secondary parts. Each part is described by the following fields.

Filed Number	Field	Description
24.	Description	The description of the connector (from Parts Specifications).
25.	Designator	The designator of the connector.
26.	Part Number	The part number of the connector.
27.	Qty	The quantity of the part described (according to designator) that is used in the assembly.
28.	C/Angle	The clocking angle of the connector.

Notes

The standard notes attached to the MBTP document, Parts list, and Wire list are printed on a separate page. This page appears following the 1st End Terminator report (if no 2nd End Terminator report was made) or following the 2nd End Terminator report (if both 1st and 2nd or just the

2nd was made).

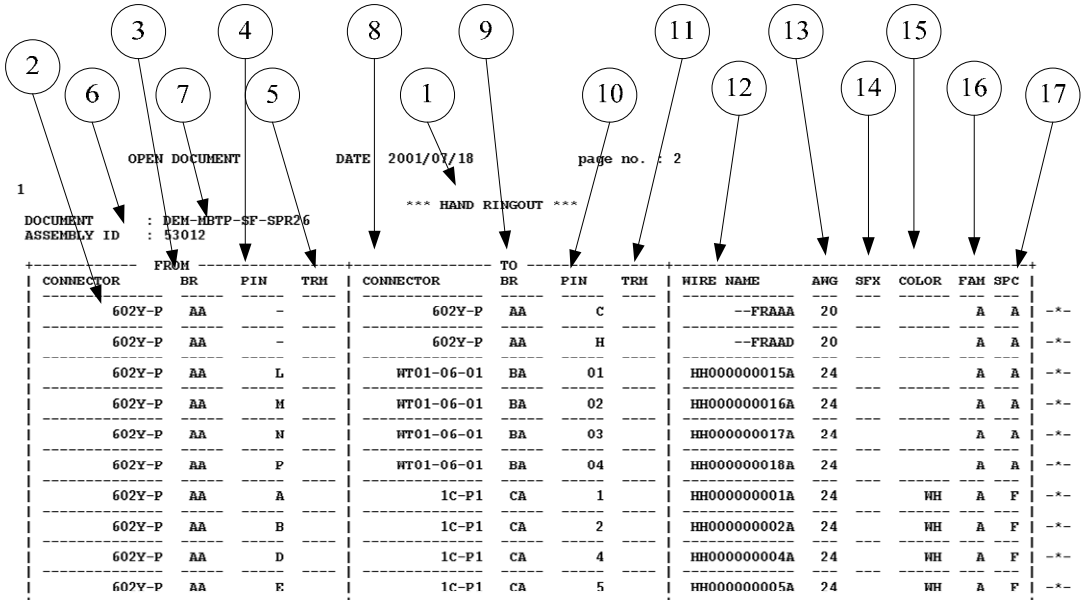
The notes order is determined for the MBTP document using the Standard Notes option (modify MBTP). This operation assigns a sequence number to each note used in the MBTP, Wire list, and Parts list documents.

```
Wire List 2nd End TerminatorDOC NO.  AVI-MBTP-12345-001            REV    **    VER      WIRING DEPARTMENT #9999

    NOTES :

             1    (1) THIS IS THE FIRST LINE OF NOTE #1
                      THIS IS THE SECOND LINE OF NOTE #1
                      THIS IS THE THIRD LINE OF NOTE #1
             2    (5) THIS NOTE IS FOR PARTS
                      THIS LINE CONTIUES PARTS NOTE #5
             3    (6) THIS NOTE IS ONLY FOR PART OCCR.
             4   (10) THIS NOTE IS FOR ALL APPLICATIONS
             5 (1201) TESTING MBTP NUM. 2
             6    (4) THIS NOTE IS FOR WIRES
                      CONTINUATION OF NOTE # 4
             7    (7) THIS NOTE MAY BE USED FOR WIRES
```

Standard Notes

Hand Ringout

The Hand Ringout report describes how to perform a ringout test for the bundle.


2
3
4
8
9
11
13
15
6
7
5
1
10
12
14
16
17
OPEN DOCUMENT DATE 2001/07/18 page no. : 2
1
*** HAND RINGOUT ***
DOCUMENT : DEM-MBTP-SF-SPR26
ASSEMBLY ID : 53012
FROM
TO
CONNECTOR BR PIN TRM CONNECTOR BR PIN TRM WIRE NAME AWG SFX COLOR FAM SPC
602Y-P AA - 602Y-P AA C --FRAAA 20 A A -*-
602Y-P AA - 602Y-P AA H --FRAAD 20 A A -*-
602Y-P AA L WT01-06-01 BA 01 HH000000015A 24 A A -*-
602Y-P AA M WT01-06-01 BA 02 HH000000016A 24 A A -*-
602Y-P AA N WT01-06-01 BA 03 HH000000017A 24 A A -*-
602Y-P AA P WT01-06-01 BA 04 HH000000018A 24 A A -*-
602Y-P AA A 1C-P1 CA 1 HH000000001A 24 WH A F -*-
602Y-P AA B 1C-P1 CA 2 HH000000002A 24 WH A F -*-
602Y-P AA D 1C-P1 CA 4 HH000000004A 24 WH A F -*-
602Y-P AA E 1C-P1 CA 5 HH000000005A 24 WH A F -*-

A Hand Ringout Report Page

Each data page of a Hand Ringout report contains the following information:

Filed Number	Field	Description
1.	Report Type	Hand Ringout Report.
2.	FROM CONNECTOR	The connector the First end of the wire is connected to.
3.	FROM FER FAM	The ferrule family of the From connector
4.	PIN	The number of the pin the wire comes from.
5.	TRM LUG	The From Termination Code field (Bin code or Lug).
6.	ASSEMBLY ID	The base number of the bundle.
7.	DOC NO	The document number of the selected MBTP document.
8.	CONNECTOR	The connector the other end of the wire is connected to.
9.	TO FER FAM	The ferrule family of the To connector.
10.	TO PIN	The number of the pin the wire is connected to.
11.	TO TRM LUG	The To Termination Code field (Bin code or Lug).
12.	WIRE NAME	The wire name.
13.	AWG	The American Wire Gauge (cross-section) of the wire.
14.	SFX	The Suffix of the wire (e.g., N for Ground, AL for Alumel).
15.	CLR	The color of the insulation used for the wire.
16.	FAM	The name of the shield the wire is in (determined by the Integrate Wires program).
17.	SPC	The Spec Type of the wire.

Chapter 6: Release MBTP Document

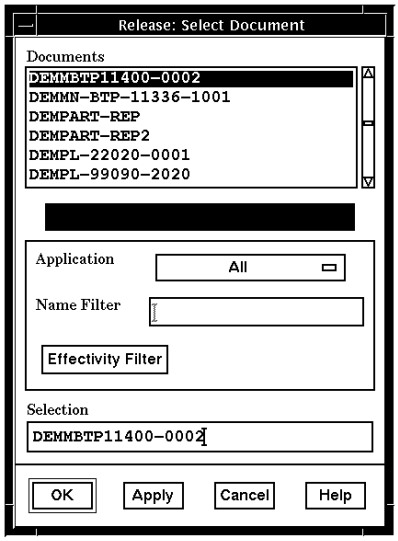
The MBTP is a document like all others regarding Configuration Control. Therefore, the document must go through a Release Process in order to maintain a history of modifications and alterations.

A ***HarnesSYS*** flat file is produced for this document. All inquiries about this MBTP are replied via the flat file.

Releasing the MBTP Document

1. Select an MBTP document to release or select **Configuration → Release → Document...** from the Working Space Menu

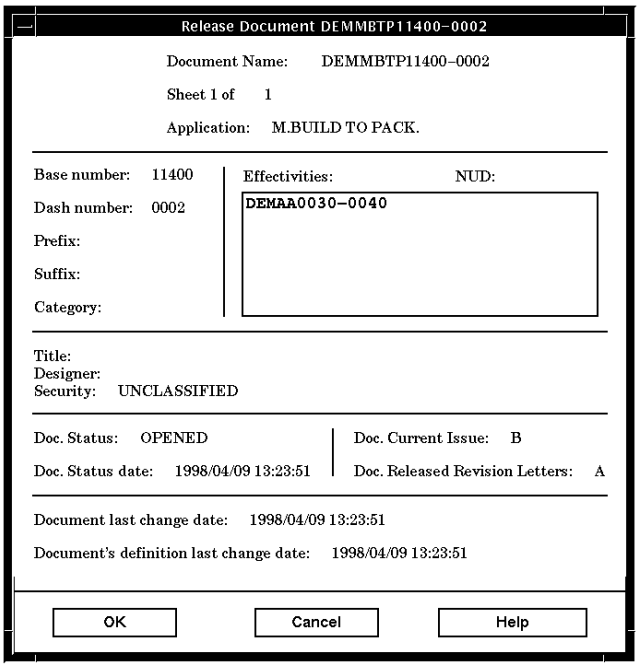
   The Release Document Window appears



Select Document for Release Window

2. Select your required document using <MB1> and Click **OK**.

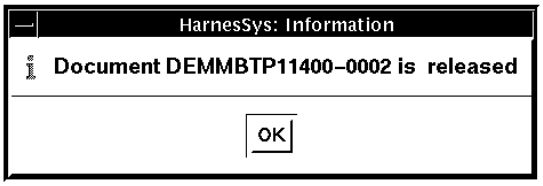
The Document's Release Window appears for confirmation, showing the document's parameters



The Release Confirm Window

3. To confirm click **OK**.

The confirmation message appears.



4. Click **OK** to exit

Index

2

2D Routing Diagrams, 5

B

Banner Page, 30, 65
Brady Tape
  updating, 27
Brady Tape Defaults, 11
Braid Defaults, 12
Build to Package (BTP), 5

C

Changing Designator Data, 59
Changing Paths Data, 57
Changing Wires Data, 58
Coil Summary, 67

E

Error Messages, 29

H

Hand Ringout, 78

I

Integrating an MBTP, 15

J

Jig Diagrams, 5

L

List of 1st End Solder, 35
List of 2nd End Solder, 38
List of Wires Not Connected at Either End, 41

M

Manual Changes for Manufacturing, 49
Manufacturing Build to Package, 6
Manufacturing Operations, 6
Manufacturing Project Defaults, 9
MBTP, 6
MBTP Reports, 63
Modifications, 47

T

The Work Order Report
  creating, 30
Twist Sequence, 31
Types of Documents, 5

W

Wire List 1st End Terminator, 72
Wire List 2nd End Terminator, 75
Wire List by Coil, 69
Work Order Report
  creating, 17
Working Report
  creating, 28

This user guide is one of a set of user guides that make up Volume **7** of the ***HarnesSYS*** user documentation. Below is a description of the volumes of the ***HarnesSYS*** user documentation:

Volume 0 – Getting Started.

Volume 1 - Schematics.

Volume 2 - Layout Drawing.

Volume 3 - Wires.

Volume 4 - Parts.

Volume 5 - Integration.

Volume 6 - Management and Configuration Control.

Volume 7 - Manufacturing.

Volume 8 - Technical Publications.

Volume 9 – Retrofit.